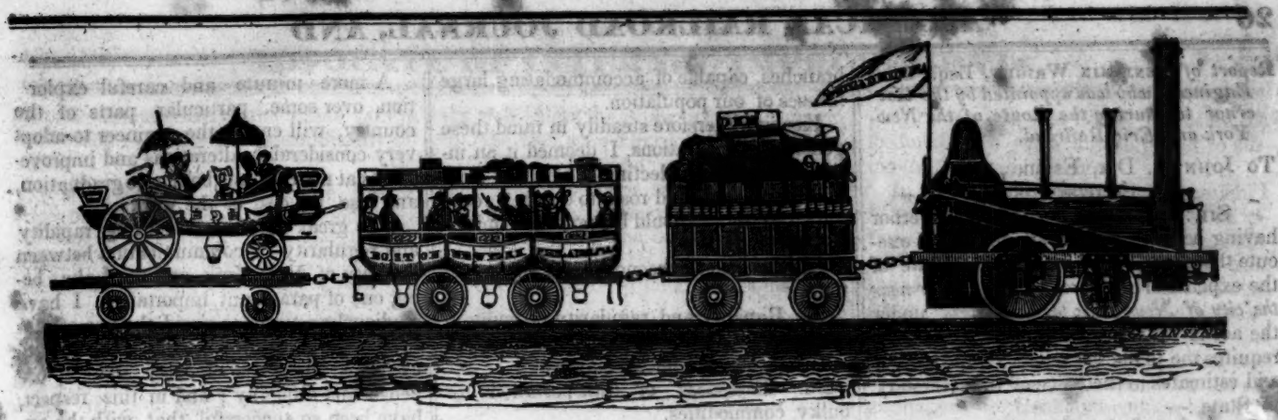

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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D. K. MINOR, Editor.] SATURDAY, JANUARY 31, 1835. [VOLUME IV.—No. 4.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 31, 1835.

☞ We would ask particular attention to the Report of the different Committees appointed by the Baltimore Internal Improvement Convention, and, in short, to the *whole* Journal. It contains matter for serious reflection by all who feel an interest in the continued prosperity of this city, or state.

NEW-YORK AND ERIE RAILROAD.—After years of anticipation of the benefits, and estimation of the cost, and doubt, by many, even of its friends, of the success, of this great work, we now have something before us upon which we may rely. The Report of BENJAMIN WRIGHT, Esq., who was appointed by the Governor, under an act of the Legislature, to make the survey, which was made on Thursday, 29th inst., to that body, is far more favorable, and presents much fewer obstacles, than was anticipated. We had heard much of the favorable route ascertained by the engineers, but the most sanguine friends of the work could not have anticipated one with so few and moderate elevations to overcome.

This report will do great credit to the able and so justly celebrated engineer to whom the survey was entrusted; and to his assistants, Mr. James Seymour, and Mr. Charles Ellet, each of whom had charge of one of the grand divisions, as well as to those who composed their respective corps, for their industry and perseverance in accomplishing a survey and estimate so extensive, in a period so limited. By this report it will be seen that the obstacles, heretofore considered insurmountable, are by no means equal to those overcome by our neighbors of Pennsylvania, and of Maryland. They will not, we feel confident, delay for a single day, the progress of the work. And it is to be hoped that the information now before the Legislature will insure its favorable action upon the application of the company, for the aid of the State.

The New-York and Erie Railroad can only be considered as a great national work. It will be as great an improvement upon the *present*, as it is upon that mode of communication in use before the construction of the canal. The canal reduced the *cost* of transportation in the proportion of 100 to 25 dollars per ton, and the *time* as 18 to 6 days, from Albany to Buffalo. The railroad will produce an equal improvement upon the present mode of travelling, and the transportation of light and valuable freight—only the order will be reversed, thus: the *time* will be reduced as 4 to 1, and the cost as 2 to 1, or thereabouts. In these estimates we may not be precisely, to the *penny*, correct; but we are in the main correct, and are willing to risk the little, whether it be of reputation or of property, we possess, on the result, if the work shall be *speedily* and *properly* constructed. Upon these *two points, however, and especially the first contingency, rests the success, not only of this, but of* ALL *the great works of internal communication, whether now in use, or in contemplation in our State.*

By the reports of two committees appointed by the *Internal Improvement* Convention, held at Baltimore, which will be found in this number of the Journal, it will be perceived that there is an untiring spirit of honorable enterprize pervading, and which does great credit to, the States interested in the works now in course of successful construction south of us; which, if permitted to take, will for a long time *retain*, the lead of us in such works; and will also divert from us a great share of that immense and rich trade which we have *claimed* as our *right*—which *right*, however, will be found, when too late for us to enjoy it, to be vested *only* in those who had the prudent foresight to secure it, not by acts of *legislation* only, but by acts of ENLIGHTENED POLICY and persevering industry, worthy of an age of statesmen and patriots.

With a climate more favorable, and little over one half the distance to construct their works, Maryland and Virginia will at no distant day divert to their seaports much of the produce of the fertile country west of the Alleganies; which, with an easy, cheap, and, above all, *speedy* means of reaching this port, would certainly come here; and, when they purchase the produce of the West, they will assuredly supply them with those articles of convenience and luxury which are now mostly obtained in NEW-YORK. Does it not then become the imperative duty of our citizens, and especially of the present Legislature, to adopt such measures as will secure to us the benefits we now claim as our own; and which, by the favorable topography of our state, we may do, (notwithstanding the advantage of our neighbors in climate and distance,) if we construct a continuous line of railroad to Lake Erie, and thereby obviate the great difficulties under which we now labor for *more than one third* the year! As a matter of *policy*, at least, if not as an act of justice, to many of our own citizens, we think the Legislature should act promptly and liberally in this matter.

There is another reason to be urged in favor of prompt action by our Legislature. Not only are Pennsylvania and Maryland moving shoulder to shoulder in the cause of internal improvements, but Virginia is also aroused from her long sleep. She has witnessed within her own territory the benefits of a railroad, a circumstance which we, two years ago, predicted would be worth to her citizens five years of argument and speculation; and she is now disposed to remedy the evils of her long delay, and has come forward and taken such a share in the stock of the contemplated James river improvement as will ensure its success; and we hold it certain, that if that work should be made into the valley of Virginia, and the *New-Orleans and Nashville road*, now under survey, and said to be through one of the most favorable routes in the world, also completed, before the New-York and Erie road is commenced, *the great railroad thoroughfare* from Boston to New-Orleans, will never pass through the *interior* of New-York, but must, beyond question, find its way through Washington City, and the Valley of Virginia, or further south, and connect with the New-Orleans road at Nashville; whereas, if we forget sectional feelings and self-interest, and look only to the general good, we may secure the benefits of this great thoroughfare, and by continuing it through the corner of Pennsylvania to Ohio, and connect with the Mad river Railroad, we may then with little difficulty connect with the New-Orleans and Nashville road, as we understand that charters will be granted this winter, both in Kentucky and Tennessee, for its continuation to Louisville, thus holding out to us the right hand of fellowship, and the offer of their best efforts to make the city of New-York the depot of the produce of their soil. Shall we slight the offer to gratify private interest, or sectional feeling! WE SHALL SEE!

On Thursday last, on motion of Mr. CASH, eight times the usual number of copies of the report of Judge WRIGHT, of the survey of the New-York and Erie Railroad, were ordered to be printed, and 100 additional copies for the use of the engineer.

Report of BENJAMIN WRIGHT, Esq., *Civil Engineer, who was appointed by the Governor to Survey the Route of the New-York and Erie Railroad.*

To JOHN A. DIX, Esquire,
Secretary of State:

SIR:—His Excellency the Governor having been pleased to appoint me to execute the survey, and make an estimate of the expense of a Railroad from "*at or near the city of New York to Lake Erie*" under the act of May 6th 1834, which said act requires me to file the report, maps, profiles and estimates in the office of the Secretary of State:—

In conformity to said act I now present my report, maps, profiles &c., to be filed in your office, as the law directs, and beg leave hereby

TO REPORT:

That in undertaking the important and responsible duty of surveying the route of a railway communication from the Hudson river, near the city of New York, to Lake Erie, I deem it essential to keep in view the great public objects sought to be attained by the proposed work. It was obvious that the road was to be constructed, not only for the accommodation of the inhabitants of the district immediately adjacent to the route, but also in order to furnish the means of a regular, rapid and uninterrupted intercourse, at nearly all seasons of the year, between the city of New York and the extensive and populous communities upon the Western lakes and waters.

The vast and acknowledged benefits which had been experienced throughout a great part of the State, and especially by its commercial emporium, from the construction of the Erie Canal, as well in the increase of population and wealth, as in the progress of agriculture and trade, the augmented value of lands, and the rapid and unexampled growth and creation of cities, towns and villages, along the route, had plainly proved that a thoroughfare running through the southern tier of counties, and properly suited to their topographical character could not fail to impart similar advantages to that important and valuable section of country, while the pressing necessity of establishing a channel of communication within this State which should be open during nearly, or quite the whole of the winter months, and thereby remedy the evils occasioned by its high northern latitude, had not only been felt sensibly by the inhabitants of the metropolis, but had excited public attention throughout a great portion of the fertile and extensive regions upon the upper Lakes, and in the valley of the Mississippi.

The long line of counties in our own State, through which the road would pass, favored as they are with a healthful climate and an enterprising population, abounding in natural resources which the proposed work could not fail to develope, also possessed an additional importance in their peculiar topography, being intersected in numerous directions by important streams, leading into that section of the country from other parts of the State, and thereby furnishing striking facilities for connecting the proposed road with lateral branches, capable of accommodating large masses of our population.

Keeping therefore steadily in mind these general considerations, I deemed it an incumbent duty in selecting the line of location for the proposed road, to obtain a route which as far as should be practical might combine:

1st. Reasonable economy in its construction.

2d. Rapidity and regularity of communication for passengers, light merchandize of value, and the public mail.

3d. Cheapness of transportation for bulky commodities.

4th. Facilities of connection with lateral branches.

5th. The general accommodation of the inhabitants, and the development of the resources, of the country along the route.

And I considered it also necessary to take into view, not only the present, but the prospective advantages of the route, and to arrange the graduation of the whole work, in reference to such further additions and improvements as might hereafter become necessary in order to accommodate a great increase of trade and transportation.

Being guided by these general outlines, I commenced the survey of the route on the 23d of May last, under the appointment which I received from his Excellency the Governor on the 21st of that month.

The work was divided into two grand divisions: of which the *Eastern* extending from the Hudson river to Binghampton, was under the direction of James Seymour, and the Western from Binghampton to Lake Erie, was placed under Charles Ellet, Jr., both acting as my assistants and subject to my supervision.

Those gentlemen, with my advice and approbation, each had sometimes two, and often three and four parties employed in explorations through the season. From each of them I have received separate reports, with their views of plans and description of country through which each had passed.

I take great pleasure in stating, that the surveys thus committed to their care, have been executed to my entire satisfaction, and I refer to their reports and estimates of quantities, as exhibiting the industry and skill with which their duties have been discharged.

I have personally inspected the lines surveyed nearly their whole length, and have particularly considered and examined every part of the route, at which there could be any reasonable doubt or difficulty, and we have fully advised and compared opinions, as to all prices estimated for the graduation of the work.

It is possible, and I may say probable, that the shortness of time allowed for the completion of so long a line of survey, in some instances not noticed by me, may have prevented our ascertaining the very best and cheapest route, of which some portions of the country may have been capable; but I have become perfectly satisfied from the lines already run, and minutely measured, that a feasible route has been obtained, free from formidable difficulties, and capable of being completed with economy and despatch.

A more minute and careful exploration, over some particular parts of the country, will enable the engineer to adopt very considerable alterations and improvements at many points, both as to graduation, and also the cost of the work.

The great object of securing rapidity and regularity of communication between the city of New York and the Lake, being one of paramount importance, I have studiously sought to avoid the use of stationary steam power on inclined planes, as being productive of delay, danger, expense and difficulty; and in this respect, have been so successful, that, with the exception of one single plane near Lake Erie, I have brought the whole line within the power of Locomotive Engines, drawing passenger cars, light merchandize and the public mail.

The steepest acclivity encountered on the whole line, with the exception beforementioned, will be only one hundred feet per mile; and having been furnished with satisfactory evidence that by recent improvements in the locomotive steam engines, on the Baltimore and Ohio Railroad, they have been enabled to ascend an acclivity of one hundred and seventy-six feet to the mile, drawing between five and ten tons weight, I rely upon that fact in stating, that locomotive steam engines may be advantageously used on the whole of the proposed route, from the Hudson river to the head of the plane near Lake Erie: that they will be able to pass its steepest grades, drawing at least 70 or 80 passengers with their baggage; while upon at least nine-tenths of the whole route, they will be able to propel very great burthens at a great rate of speed.

In order, however, to obtain these easy grades of acclivity, I have been compelled to pursue, by a serpentine line, the valleys of streams, and thereby to lengthen very considerably, the linear extent of the route.

The general face of the country is undulating and marked by bold and prominent features; but, nevertheless, it is intersected by numerous rivers and their branches, which have a gentle descent, and fortunately pursue the general direction necessary for the route, in much of the distance.

It is this all-important and cardinal feature in the topography of the country, and the facilities which the valleys of those streams thus present, for obtaining gentle ascents and descents, and moderate graduation, which will explain the reason why I have been able to find a cheap and easy route, without the aid of stationary steam power, through portions of the State which, to the eye of the passing traveller, crossing as he does the numerous hills which are traversed by the ordinary stage roads, would seem to present insuperable obstacles to the accomplishment of the proposed work.

An examination of the plans and profiles returned with this report, will show that the route instead of passing directly *over*, goes *around* the hills; and that it has not been necessary to surmount any considerable acclivities, except in three or four instances, in which the line crosses the

natural boundaries of the great valleys into which the route is topographically divided.

It is true, that the departure from a straight line thus occasioned by following the winding of the water courses, has considerably lengthened the whole route between New York and Lake Erie—But when it is considered that great rapidity of transportation, and cheapness of construction have been thereby secured, and a greater portion of country accommodated; that the conformation of the country wholly forbade the adoption of any other route, more direct, without enormous expense; and that the circuity of route will be comparatively less than that of the Pennsylvania Canals, its deviation from a direct line will not be regarded as a formible obstacle or objection.

The natural boundaries of the valleys, which are pursued by the route, will serve to subdivide it into six grand divisions, to wit:

The *First or Hudson River Division*, extending seventy-three and a half miles from a point in the Hudson river, twenty-four miles north of the City Hall of New York, to a point in the Deer Park Gap, of the Shawangunk Mountain, dividing the waters flowing into the Hudson from those flowing into the Delaware.

The *Second or Delaware Division*, extending from the point last mentioned through the valley of the Delaware and its tributaries one hundred and fifteen miles, to a summit, twelve miles N. W. of the village of Deposit, in Delaware County, dividing the waters of the Delaware from those of the Susquehannah.

The *Third or Susquehannah Division*, extending from the point last mentioned through the valley of the Susquehannah and its tributaries one hundred and sixty-three and a half miles, to a summit thirteen miles S. W. of the village of Hornellsville, in the county of Steuben, dividing the waters of the Susquehannah from those of the Genesee.

The *Fourth or Genesee Division*, extending from the point last mentioned across the valley of the Genesee thirty-seven miles, to a summit three miles E. of the village of Cuba, in Allegany county.

The *Fifth or Allegany Division*, extending along the valley of the Allegany and its tributaries eighty-three miles to the head of the inclined plane, distant four or five miles from Lake Erie, on a straight line.

The *Sixth or Lake Erie Division*, embracing the short and rapid descent to the Lake, including the inclined plane and the two branches, one to Portland, nine miles, and one to Dunkirk, eight and a half miles.

It will be perceived by an inspection of the profiles, that the only points where the rates of ascent exceed 60 feet per mile, will be founed on the summits above specified, as forming the boundaries of the six Grand Divisions of the route. The acclivities in passing these summits are respectively as follows:

One grade of 100 feet to the mile, in passing from the Hudson River Division, down the west side of the Shawaugunk mountain into the Delaware Division:

One of 70 feet, and one of 61 feet to the mile, in passing from the Delaware Division to the Susquehannah Division:

One of 70 feet, and one of 65 feet to the mile in crossing the ridge, between the Susquehannah and its tributary the Chenango River:

And one of 72 feet to the mile, in passing from the Susquehannah Division to the Genesee Division.

I have no doubt that all these ascents and descents above specified, may readily be surmounted by locomotive engines drawing passenger cars, light merchandize and the mail. But in order to aid the passage of burthen cars heavily loaded, it will be necessary to station at the several points above specified, either auxiliary locomotive engines, as is practised on the Liverpool and Manchester Railroad, or an increase of animal power, as is used in passing the Parr Ridge, on the Baltimore and Ohio Road. That this can be effected without any material interruption or inconvenience, will be obvious, when it is recollected that the western slope of the Parr Ridge, on the last mentioned road, has an ascent of no less than 253 feet to the mile, an acclivity nearly three times as great as the steepest grade on the proposed route, but that it is nevertheless surmounted at all times by burthen cars heavily loaded, aided only by an increase of animal power.

It will also be borne in mind, that at least three-fourths of the heavy tonnage passing on this road, will descend eastward towards tide water. The elevation of the head of the inclined plane near Lake Erie, being 1303 feet above the Hudson River, the products of the Western country passing eastward, will necessarily descend 1303 feet more than they will ascend, and their passage will consequently be aided to that extent by their own gravitation.

It is, however, by no means impossible, that in the course of twenty years, the great increase of the population and agricultural products of the interior, and the necessity of expediting their passage to market, may render it expedient and economical to adopt additional tracks with a compound moving power and grades reduced in all cases to 30 feet per mile, with stationary engines, operating on inclined planes, and located at intermediate points along the road. In that event, the entire change might be effected along the whole line, without altering more than thirty or forty miles of the Road.

And although I do not believe that this change will ever be made or become necessary, except in the event of so great an increase of trade as to make steady uniform power the best, in which case I believe that stationary power applied on the present grades would be found the best, and used as Messrs. Walker & Rastrick proposed on the Liverpool and Manchester Road, as *reciprocating power*,—I have thought it proper to state how far it would affect the graduation of the road to substitute planes and stationary power, and grades in other places of 30 feet per mile.

The change of plan last mentioned would only apply to burthen cars in any event, as passenger cars would be liable to less danger, interruption and delay, by using the locomotives or extra animal power to surmount the dividing ridges.

In making the survey and location, I have had lines of exploration made on various parts of the route, in two or three different directions, and more particularly near the Hudson River, where four different routes to several landings were examined, and are all represented on the maps and profiles herewith returned; and if the funds had held out to accomplish some further examinations in Rockland county, and time had permitted, I should have pursued still another line from a point on map No. I, marked Z, and followed on the northern and eastwardly side of the Hackensack River, in the direction of the dotted line, so as to join the line which runs to the River at Tappan. Such a line ought to be explored before the final location of the Road through Rockland county.

Another part of the line in Orange county ought also to be noticed, as deserving of further examination, which is exhibited on maps Nos. 3 and 4. A strong and ardent desire to accommodate by passing in the immediate vicinity of so important a town as Goshen, and former examinations for a Railroad having produced impressions favorable to that route, I had supposed it would prove the best ground, and therefore spent our labors upon it; and it was not until it was too late, that we observed the formation of the country from near Chester through by Florida, and the practicability of passing the Wall Kill near Pellet's Island, and joining the present line some six or seven miles west of Wall Kill, that we supposed we could change from the route near Goshen. This route requires an instrumental examination, but unless it prove greatly superior to that by Goshen as now returned, the accommodation of so important a town ought to give it the preference. The routes between the Wall Kill and Shawangunk mountain are exhibited on the map and profiles, and a final location on this part is intimately connected with the suggestion about the Florida route.

It has been proposed to cut upon the top of the Deer-Park Gap, (which is a deep depression of the Shawangunk Mountain,) about 50 feet at the highest point. This is done in order to reduce the grade upon each side, and particularly on the west side, to 100 feet per mile. The east side can be easily reduced to a grade of 60 feet, for a short distance, and then much less.

I have looked at this point, and given it considerable thought, to determine what ought to be the present plan, in reference to future improvements, when the great increase of business on this road will demand every facility that the nature of the country will permit; and it has brought my mind to the conclusion, that before the lapse of 20 years after the completion of the road, a tunnel will be driven through the mountain, of about three-quarters of a mile in length, whereby its elevation would be so reduced, as to permit a grade of probably 75 to 80 feet, on the west side, and about 30 on the east. As the acclivity of 100 feet to the mile on the west side of the

mountain, is the steepest grade encountered on the road, it has also appeared to me to be well worthy of observation, how far this ascent could be relieved, by the adoption of an inclined plane with a stationary engine, believing, that if it is admissible on any intermediate point on the route, it might be employed at this point, for the relief of the burthen cars, to great advantage. The idea of the tunnel and the stationary engine, will, however, be matters of subsequent inquiry, at some future time, and are now referred to, only as parts of an ultimate plan, proper to be borne in mind, in the permanent location of the route.

The line as located, then follows from the foot of Shawangunk Mountain, by a high embankment across the Valley of Basher's Hill, and then crosses the Delaware and Hudson Canal without difficulty, and soon enters the Valley of the Neversink River, which it follows to the mouth of a branch of this river, called the Sheldrake, and up that to its source: thence crossing the heads of the several branches of the Mongaup, it reaches the head of the Callicoon, (a branch of the Delaware,) which it follows to its junction with the latter river.

An examination of the ground plans will show, that a route has also been surveyed down the Popackton, or eastern branch of the Delaware, and there are also exhibited and marked several other routes through Sullivan County, which have been examined, and regular surveys carried over them, and profiles made of some.

The route passing near Monticello, which is the County town of Sullivan County, would on that account deserve a preference, if the facitities and advantages are nearly equal as to other points, such as grade and cheapness of construction; and although our surveys, as we made them, did not show as favorable a line by Monticello as by the other route, I think a further and more critical examination should be made through this district of country, to find a more favorable route than we have yet seen; and should this be the case, we should, I think, shorten the route some miles, and obtain the advantages of carrying it through a more populous and settled country.

Although the route marked on the plan as following up the Eastern, or Popackton branch, and then the Beaver Kill and Williwemach and Little Beaver, has been regularly surveyed, and profiles of it returned, I however consider the route by the Callicoon to be so far preferable, that I have not required my assistant to give me quantities on this route, and have not of course estimated it, but it can be done hereafter, if necessary or useful.

In carrying the route of the Railroad through the heart of Sullivan County, and thereby giving great and permanent advantages to a large district of country, capable of sustaining a considerable population, I will make this passing remark, that by passing down the valley of the Neversink from the foot of the Shawangunk Mountain until I reached the valley of the Delaware River, and then passing up the Delaware to the mouth of the Callicoon, I might have found a route of much easier grade, and which would not average over fifteen feet to the mile. But to that plan there are, in my mind, serious objections. 1st. It would be a more expensive line to grade, on account of its passing along steep side hills, and heavy ledges of rocks, requiring expensive rock excavation. 2d. It would not accommodate, or be very useful to Sullivan County, as the country along the bank of the Delaware is not generally favorable to cultivation. 3d. It might come into collision with the Delaware and Hudson Canal, and perhaps divert some of its legitimate and fair business; and in its construction it might interfere with and injure that important and very useful work, for the execution of which, its enterprizing proprietors deserve to be gratefully considered.

The line then passes up the Delaware from the Callicoon to the village of Deposit, from which a lateral road may easily be extended into the heart of Delaware County. The route then crosses by a bridge the main or Mohawk branch of the Delaware, and thence follows up the Oquago Creek to its source, on the route towards Bettsburg, from whence it descends to the Susquehannah, and passing that river near Nineveh, follows up the valley of Belden Brook to its source, and then taking the head waters of Page Brook, follows that down the Chenango to Binghampton, or its vicinity.

An examination of the maps and profiles will show, that several routes have been examined between the Delaware River at Deposit and the Chenango at Binghampton, and that lines were run on the most favorable ground, on a nearly direct course between Deposit and Windsor on the Susquehannah, and between Windsor and Binghampton from the Susquehannah to the Chenango.

Both these summits, however, proved to be considerably higher than those on the route chosen; and they cannot be overcome but by stationary steam power. For a more particular description in detail, of the difficulties to be overcome, I refer to the report of Mr. Seymour, and will only add, that after having attentively examined these routes, I am decidedly of opinion, that the northern route by Bettsburg and by Nineveh and Page Brook, ought to be adopted. That route, moreover, will possess a local advantage of peculiar value, in the facilities it will give to various branch Railroads leading into the populous and wealthy sections of the State, along the valleys of the Upper Susquehannah, the Unadilla and the Onondaga branch of the Chenango, and thus accommodating the counties of Otsego, Chenango, and Cortland, and parts of the adjacent counties.

When the line came near the mouth of Page brook, on the Chenango, it became a question to determine which side of the Chenango we should pass down to near its mouth. A desire to approach near, and even pass into, the growing and important village of Binghampton, determined me to have the survey made on the east side, but ascertaining that the Chenango Canal had not then been finally located, I directed a survey on the west side also, and to pass the river near the mouth of Page's brook. This part of the line I do not consider as settled, neither can it be finally determined until the canal is nearly completed; when that shall be done, we can see if there is a fair chance of carrying our railroad on the upper side at a reasonable expense; and should this be the case, a preference ought to be given to the east side of the Chenango, so as to approach near to Binghampton, and pass over the river near the upper part of that village.

From the Chenango river the route in following down the Susquehannah valley for about 40 miles, passes through the flourishing village of Owego, where it will become connected with the steamboat line now in preparation for navigating the Susquehannah, and also with the Owego and Ithaca Railroad, which will connect the main line with the important and fertile section of the State adjacent to the Cayuga and Seneca Lakes. After descending for 40 miles along the east branch of the Susquehannah, we approach near the Pennsylvania line, north of Tioga river, (being a large branch of the Susquehannah) and pass up its valley by Elmira, Big Flatts, and Painted Post, to the forks of the Conhocton and the Canisteo; and then following up the Canisteo to its source, we pass Hornellsville, Almond, and over the summit between the waters falling into the Susquehannah and the waters of the Genessee river.

Of nearly 130 miles on the route between the point where we leave the valley of Page brook and near Almond, the grades are all extremely easy and favorable, or can be made so.

From near Almond, in going on westward, we pass the dividing ridge where for the present we have made our grade line 72 feet per mile, but which can be somewhat relieved; and passing down Dike creek, we fall into the Valley of the Genesee river, and run down that a few miles and then up the Valley of Van Campens brook, through the villages of Friendship and Cuba, until we take the Valley of Oil creek, then down that to its junction with Ischua creek, and down the Valley of Olean creek to the Allegany river.

Through this district from the summit between the waters of the Susquehannah and Genesee and the waters of Genesee and Allegany, we have some grades which reach 50 feet per mile as the line is now run, but it is believed that considerable improvement will be made in this part on a revision of the line.

Having reached the Valley of the Allegany, we pass down it about 26 miles, over excellent ground, generally, to the Indian village, near the Cold Spring creek. There leaving the Allegany, we pass up the Valley of the Cold Spring and over a small swell of land, and descend into the Valley of the Little Conewango, a branch of the Large Conewango; and passing down that stream, and the Large Conewango, passing the village of Randolph, in Cattaraugus county, and the villages of Waterboro' and Kenedyville, in Chatauque county, following down the Valley of the Great Conewango to the Casadaga branch, and up that to its junction with Chatauque outlet,

we then follow up the Casadaga valley to Bear creek, and up that to near Bear lake: here we arrive at the dividing point between the waters which run southerly into the Allegany and those which run northerly into Lake Erie.

At this point we are only about five miles in a direct line from Lake Erie and 740 feet above it; and here is a place where we find ground favorable to descend by one plane 506 feet in a distance of about one and a half miles; and at the foot of this plane we find ourselves nearly equi-distant from Dunkirk and Portland.

At Dunkirk the Government of the United States have expended considerable money in the construction of a harbor, and are preparing to expend more. At Portland there has been no money expended, except by individuals. The Government of the United States have had a regular survey and estimate of cost to make a harbor. I have obtained plans of each of these places, and return copies of them herewith. It is said that the cost of making a harbor upon the plan reported by Captain Maurice, of Portland, would be forty thousand dollars.

It will be seen by the maps and profiles returned, that a route was surveyed from Randolph, in the County of Cattaraugus, up the Valley of the Great Conewango to its source, and then striking off towards Dunkirk. This route was tried in order to find a more direct and shorter course to Dunkirk or to Fayette, at the mouth of Silver creek. This latter place has claims for its natural advantages for a harbor, and probably will receive attention at some future day.

In running the line to the head of the Conewango, and from thence beginning to descend the declivity toward Lake Erie, I was in hopes of finding ground favorable for descending at 50 or 60 feet per mile, and reaching Dunkirk by that grade, and thereby doing away the necessity of stationary steam power and inclined planes, but I found the whole face of the country so cut by gulfs and intersected by ridges, that I was defeated in my project, and abandoned it. The plan appears to me to deserve further exploration before a final decision.

I had also lines of survey run on each side of Chatauque Lake, and thence to Portland, which are particularly mentioned in Mr. Ellet's report to me: but I have not had maps and profiles of them made.

In selecting the Casadaga route, I have considered the advantages of its passing through the centre of the County of Chatauque, and approaching within about three and a half miles of Jamestown, at present the largest of all the towns in this valuable county. Its approximation also to the harbors of Portland and Dunkirk, tends to entitle it to a preference, while the strong probability that improvements will soon be made in the Alleghany river so as to render it at all times navigable for steam boats, and the fact that it may now be navigated during a considerable period in the spring, render it desirable to continue the route as far as practicable down the valley of that stream, and thereby facilitate the direct communication between the city of New York and the great valley of the Ohio. And it ought also to be borne in mind that the construction of the road as far as this point, will go far to insure its continuation through the Western States to the Mississippi river, in which event that great western branch would leave the main line near the month of the Casadaga creek.

The above are the general outlines of the route, but for more minute particulars, I beg leave to refer to the Reports of my assistants Mr. Seymour and Mr. Ellet, which are herewith presented, with the details necessary.

The total amount of linear extent from the Hudson river to Lake Erie will be 483 miles, which distance may however be shortened from 10 to 15 miles by alterations in the route which may be found desirable upon a further survey. The curves upon the roads are generally easy, none of them having less than 500 feet radius.

The graduation of the road has been estimated throughout, for a double track including embankments in all cases of solid earth, and embracing all necessary bridges viaducts and culverts, together with the expenses of grubbing and fencing, comprehending in fact the whole cost of the road, except that of superintending, of the damages (if any) to be paid for the land to be taken, and the expenses of the Engineer department.

According to the report of Mr. Seymour the expense of graduation, thus estimated, for the 222 3-4 miles between the Hudson river and Binghampton will amount to $1,551,982, being $6,968 10-100 per mile; and according to the report and estimate of Mr. Ellet the expense of graduation thus estimated for the remaining 260 1-4 miles, will be $1,165,536, being $4478 51-100 per mile. Total graduation of the 483 miles $2,717,518, or $5,626, 33-100 per mile, including fencing, clearing in timber land 100 feet on each side (to prevent trees falling on the road,) and also all bridges over rivers, viaducts, culverts, road crossings, &c. &c.

Cost of grading as above	$2,717,518
add 10 per cent. for contingencies.	271,751
	$2,989,269

The cutting and embankments are all 25 feet wide, and the slopes of the embankments are one and a half base to one perpendicular. This I consider as a permanent and solid form. and calculated for stability.

The expense of superstructure will vary according to the particular plan which shall be adopted.

I have caused cross sections of several different roads now completed to be drawn, and have also drawn some which I think well adapted to the country through which the road will pass, for 400 miles, if a wood and iron road is adopted—there may be seen marked No. 5. That marked No. 2, is also of wood and iron, and is the common road as now built between Schenectady and Ballston, and such as will be built between Schenectady and Utica.

Such a Road as No. 2, if built of yellow pine and oak or chesnut, will cost in Orange or Rockland about 2890 dollars per mile.

Such as No. 5, will cost about 3400 dollars per mile.

Such as the Camden and Amboy, and the Columbia and Philadelphia Road, cost 10 to 12,000 dollars per mile.

The Petersburg and Roanoke cost about 2600 dollars per mile, as I have been informed.

These are all for a single track with one turn-out or sideling to each mile.

If the sum of $3,400 per mile be taken it amounts to	1,642,200
	$4,631,469
Add for Engineering, &c. 3 per cent. on 4,359,718.	130,791
Total,	$4,762,260

This sum will grade and bridge over rivers the whole road for two tracks, and put down one track: which is all that ought to be done, until the road is travelled nearly its whole length; and this also includes the inclined plane and steam power to operate upon it, and also a long and expensive wharf into the Hudson River.

These estimates are, in my opinion, liberal, and such as will make an excellent road, and, as I have before observed, there are many places where a great reduction might be made in the expense, by a small alteration of the grade. There are also very great reductions which may be made in the out-lay of capital in the construction of this road, by making timber work in many places where I have made calculations of earth embankments.

There is no doubt that when a final location of a working line shall be made, the Engineer would be able to make small variations in the line which would very greatly reduce the expense. I make these remarks to shew that there is no doubt in my mind of the estimate being amply sufficient for grading the road.

The bridges over the large rivers, I have also estimated higher than they will cost, if only built without regard to roofing or otherwise protecting them from the weather. I have considered and planned these bridges to be only 16 to 18 feet wide, and so formed as to have a double track over them, but that so fixed as that loaded trains of cars cannot pass each other on those large bridges. I did not think so much weight, as two trains of loaded cars passing different ways, ought to be permitted to pass on a bridge at the same time. It would perhaps bring 50 tons or more on it at the same moment, which is improper, unless in one long extended train.

I have also estimated one turn-out or sideling to each mile. If locomotive power is used on the long easy grades before mentioned, these turn-outs ought to be dispensed with, and only placed at every 5 to 10 miles, as they are found extremely troublesome when locomotive power is used, owing to the carelessness and inattention in leaving them open, when they ought to be shut. I find that on Railroads now in use, the test of experience has shewn it necessary to take up turn-outs which had been placed every mile, and only place them once in 10 miles, and that at the water stations for the locomotive, and in this case the man who attends the water stations sees to the turn-out being in its place whenever the cars are coming in sight.

In making the estimate, I have put down the item of fencing and also clearing away the timber on each side of the Railroad for 100 feet wide, to prevent trees from falling on the road. These items are of that kind that in many instances there may be ar-

rangements with the owners of property to save some part of the estimated cost.

I have said that water stations, where locomotives are used, are generally about 10 miles apart. This is the case on some roads—on others these stations are 12 miles and more distant. This is regulated by the capacity of the water cars or tanks carried by the locomotive.

The country through which we pass is admirably adapted to furnish water convenient and cheap, as the springs in the sides of the hills are elevated above our grade; so that it will only be necessary to introduce some acqueduct logs, and bring the water to the proper elevation required.

In the reports of railroads which have been constructed and are now in use, the heavy items for pounded stone, which has been used for filling up trenches, have added very greatly to the expense. Experience has, however, satisfied most of the practical engineers, that the road does not stand as well when laid on broken stone, as when laid on plank or timber, and the estimates have been made on the latter plan.

It is true that almost every where along the line of this proposed road, there is small flat stone or gravel or sand, and when the plank or scantling are laid in trenches, the small flat stone may be thrown in and rammed down, and they operate as drains to cast off the water from under these timbers into the side drains: and these being properly prepared to take away all water in them, the bed of the road is kept dry and solid.

Although the appearance of the road as located is circuitous, the curves have all more than 500 feet radius. As we have run the lines, and probably in making a final line of location, it will be found that the shortest or boldest curve need not be less than 600 feet radius. These are easier curves than some on the important roads now in use in the United States, and I do not consider that any difficulties will arise in locomotive engines turning them.

The Report of the Engineer on the Eastern Division, will show two routes from the town of Liberty in the county of Sullivan to Shohocking at the junction of the Popacton, or the East Branch of the Delaware with the West Branch in Delaware County.

I have before observed that the route down the Callicoon was preferred, because it had less difficulty as to ascent—and the Beaver Kill route would have one inclined plane near Young's Gap. This route by the Beaver Kill is, however, nearly 9 miles shorter than the Callicoon route, and admitting that the tunnels (which are represented) are made instead of going round the Bend at Hawk and Sprague Mountains, then the distance will be shortened 3 miles more at least, making 12 miles shorter.

But still it appeared on a comparison, that the saving in ascent and descent, amounting to something more than 300 feet, the easier grading on the Callicoon route, and the easier curves on the line by the Callicoon and Delaware than on the Beaver Kill route, decided my mind in favor of the Callicoon route, although at increased distance.

The law under which this survey was made, provides that it shall commence at the City of New York or its vicinity, or at such point as is most eligible and convenient.

The point on the Hudson River where the road would strike, it being still subject to further revision, and knowing that no great difficulties could arise in locating the road through the county of Westchester, the want of time and means prevented my effecting this survey. Considerations of policy would require this piece to be delayed until the other parts shall be in great forwardness, and then it will be made without doubt. All which is respectfully submitted by

BENJAMIN WRIGHT,
Civil Engineer.

January, 1835.

[From the Baltimore Patriot]

INTERNAL IMPROVEMENT CONVENTION.

The Committee of Internal Improvements appointed at the last meeting of the Convention, and instructed to report upon the present state of the public works, instituted by the people of Baltimore, and particularly to examine and report upon the propriety of recommending a town meeting to take into consideration certain proceedings of the citizens of Cumberland, in relation to a proposed Convention, beg leave to

REPORT:

That in discharge of their duty, under part of the first resolution, little else will be required than a reference to the reports which have been made from time to time, of the progress of the public works committed to the care of Incorporated Companies. These reports having been published and diffused over the community in every form, are no doubt familiar to the members of this Convention and to the citizens generally. It is therefore rather for the purpose of presenting a connected view of the subject of Internal Improvements, than of entering into any details of the actual operations upon the public works, that the committee now propose to submit a brief retrospect of the origin and progress of that system—of the causes which have impeded its advance,—of its present actual condition—and of the measures which ought to be adopted to insure its successful consummation.

In the year 1827 an immense meeting of the citizens of Baltimore was held at the Exchange, for the purpose of adopting such measures as might be found advisable to revive the city from the depressed condition to which it had fallen. The wise and experienced men who conducted that meeting, had seen for several years preceding that our city was gradually declining—that our foreign commerce was becoming more and more contracted, and our domestic prosperity keeping pace with every thing else, in the downward course. In tracing the causes which existed at home to produce this state of things,—such as the late war—its heavy national debt, and the resumption of specie payments by the banks, which reduced the currency, from greatly upwards of one hundred millions, to forty-five millions of dollars, it was hoped that when these causes had expanded themselves, the country would have passed the ordeal, and prosperity would once more spread over the land. But a little while however soon demonstrated that the causes of this national depression lay much broader and deeper, and would demand an essential change, in our national habits, pursuits, and policy. The universal peace in Europe had left the world at rest, which it could scarcely be said to have enjoyed for a period of more than thirty years. Nations which during that long period had been engaged in desolating wars and bloody revolutions, were once more thrown back upon the cultivation of the earth—the peaceful pursuit of industry and commerce, and the improvement of their social condition. The United States, which during that period might be said to have come into existence as a nation, and who had profited by her neutrality, to push her commerce into every part of the world, could not but feel the effects of the great moral and political revolutions which had just occurred; but still the conviction that an essential and radical change in our position to the rest of the world had taken place, was slowly and reluctantly adopted. Commerce was still pursued with characteristic enterprise, and years of disaster and disappointment could not drive them from the ocean. The habits and pursuits of a people are at all times difficult of reform or change, and with us it was peculiarly the case, for ours had grown with our growth and strengthened with our strength; we knew no other, and to change or abandon them was like changing our nature. Nothing but the convictions of experience could operate upon the minds of such a people, and it required years to demonstrate that the true policy of this nation consisted in turning its capital and enterprize to the cultivation of its own resources, to improve and facilitate domestic intercourse by Roads and Canals, to connect the interior seas with the Atlantic—to improve the navigation of our great rivers—to open the mines of wealth, which a bountiful Providence had placed within our reach,—to supply our own wants by the encouragement of manufactures—to foster the arts and sciences—and by all those means to build up a great empire, whose commerce would equal the world and whose independence and prosperity would be permanent and enduring.

It was with such views, and under such convictions, that the people of Baltimore, in 1827, embarked in what has since been called the system of Internal Improvement, and recommended the immediate construction of a railroad to the Ohio river. The necessary legislative enactments were soon obtained from this and the adjacent states, the various routes surveyed, and after careful deliberations, a selection was made, and the work commenced.

THE GREAT OBJECT OF THIS WORK, WAS TO FORM A DIRECT CONNECTION OF THE WATERS OF THE OHIO AND THE CHESAPEAKE, by a mode of communication then entirely novel in this country, but which information from abroad in regard to such works, satisfied us were peculiarly applicable to the improvements of our own country, and which our own experience since has confirmed.

In regard to the progress of the work, the Committee refer to the annual reports which have been made by the Directors to the Stockholders; and the committee take this occasion to say, that when the vastness of the enterprize is considered; the novelty of its character, which denied the lights of experience; the appalling difficulties which presented themselves at every step of its progress; and compare them with the unshaken firmness and perseverance of the Board of Directors, it is but common justice to accord to them the highest praise for their devotion to the public service, and their zeal in the advancement of the public interest. It is seldom indeed there will be found combined more individual worth, and moral and personal influence, than is united in those to whom this great work has been entrusted.

It appears from the last annual report of the Directors for 1833, that a controversy which had existed between the railroad and the Chesapeake and Ohio Canal Company, in respect to the right of way along the valley of the Potomac, had resulted in a compromise, by which the railroad company had obtained the privilege of continuing the railroad from the Point of Rocks to Harper's Ferry, at which point the extension of the railroad is by the same compact to terminate, until the Chesapeake and Ohio Canal shall have been completed to the town of Cumberland in this state.

The annual report from the railroad company to the Stockholders states, that the road from the Point of Rocks to Harper's Ferry is nearly done, and "it is expected will be finished soon enough to enable cars to pass the entire distance from Baltimore to Harper's Ferry, eighty-two miles in all, the coming November."

The report at p. 13 proceeds as follows:

"At a time when the road approaches so near to that point, which as has latterly been generally understood, must limit its extension for the present, and where it unites with the Winchester and Potomac Railroad, it is perhaps expected that the Board of Directors should express their opinions as to its further progress.

This seems more particularly to be called for, while the mind of this community is so feelingly alive to the efforts which have been successfully made by a rival city, to draw from its more appropriate channel the rich commerce of the

western valleys. The Baltimore and Ohio Railroad, indeed, resulted from the public opinion, which in 1826–7 declared the necessity of an effort on the part of the city of Baltimore to maintain possession of a trade heretofore enjoyed, essential to her prosperity, and threatened by the enterprising public spirit of the neighboring states. Those to whom the great enterprise of a railroad communication with the west was intrusted, were furnished by their constituents with the splendid, but vague idea only, of a bird's flight line to the Ohio river. The subject was a new one in the United States, and, indeed, almost new in England; and although the best talent within the reach of the Company was obtained, every step taken for several years after the commencement of operations was necessarily in the nature of an experiment. In looking back now with the experience that has been acquired, it is easy to see where money might have been saved, and how more work could have been done in the same time; and were the road to be commenced to-day, it is not to be doubted that it could be more economically constructed. At the time, too, that the Baltimore and Ohio Railroad was projected, the great avenue to the west, the river Potomac, was apparently open to the company, and the use of it for the construction of the road was contemplated, after the report of the first reconnoissance of the engineers was received. This avenue, however, was closed by judicial decision; and it was by agreement and purchase only that the company have been able to advance as far as to the mouth of the Shenandoah. As one of the considerations of this agreement, the railroad company was obliged to stipulate, that it would not attempt to ascend the banks of the Potomac beyond Harper's Ferry, until the canal should be finished to Cumberland, provided this were done within the time allowed by the present charter of the canal company; so that, although the route to the west, by the valley of Virginia, is still open, yet further progress up thePotomac is for the present not to be expected; and the immediate design of the proprietors of the road is necessarily postponed in its accomplishment. Under these circumstances, it may well be asked, what are the views of the Board with regard to that communication with the west which the company was created to effect.

It has already been remarked, as well in this as in the 7th annual report, that there was every reason to believe that a communication with the west might be effected by means of the valley of Virginia, and that as soon as the Winchester and Potomac Railroad should be finished to Winchester, a great portion of western travel and transportation would seek the Ohio river by that route, and that perhaps, ultimately, a railroad from Winchester to Staunton, and from Staunton through Jennings' Gap, would complete the entire railway communication.

In anticipating the adoption of this, however, as a practicable mode of establishing the desired connection with the western waters, the Board have never lost sight of the original route by the Potomac, and they still firmly believe, that this will, one day, and that not a very remote one, be accomplished.

In the opinion of the Board of Directors, the immediate interest of the stockholders, as well as of the city of Baltimore, and the State, of which Baltimore is the heart and the emporium, *now lies in the completion of the Chesapeake and Ohio Canal to Cumberland*; both in reference to the agreement of compromise already alluded to, and as forming an important link in the chain of communication, and furnishing a means of conveyance from the coal mines to tide, or to the junction with the railroad at Harper's Ferry. For the present, therefore, the Board would not think, even if they had it in their power, of making the railroad parallel with the canal; but, taking up the route where the canal terminates, at Cumberland, would push it across the mountains, upon the trace originally intended for it, and to the point of its original destination. The Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad ceasing to be, as they were for many years, hostile opponents, would then be united in interest, in every particular, and would jointly afford the desired communication. If, at any future day, the state of the trade should require it, and the income of the road should justify it, freed from the condition that now fixes Harper's Ferry as the western limit on the Potomac, the road might be brought down the River, and the continuous railroad communication, as first designed, be finally accomplished.

In the prosecution of the design thus marked out, the parties most deeply interested are the State of Maryland and the City of Baltimore; and it is to the public spirit and liberality of these, that the Board confidently look for the means to prosecute it successfully."

From the view which is here presented, the construction of a railroad communication with the west is postponed to a period necessarily indefinite; tho' the Directors indulge the hope that at some future day it will be resumed and accomplished upon the plan originally projected. For the present, however, it is true policy and common sense to consider the projected railroad to the west as terminated at Harper's Ferry, and that the company have neither the moral nor physical power to go beyond that point, by reason of judicial decisions, and their own compact with the Chesapeake and Ohio Canal Company.

In this state of things it becomes an energetic people, instead of indulging in vain regrets over their disappointment, to look forward and promptly adopt such measures as the existing state of things call for.

The Directors of the Railroad Company have freely expressed their opinion, that the immediate interest of the city of Baltimore and the State NOW LIES IN THE COMPLETION OF THE CHESAPEAKE AND OHIO CANAL TO CUMBERLAND. This proposition, after all that has passed, and coming from the source it does, is calculated to excite surprize, when thus broadly presented. But this ought not to deter us from giving it proper consideration, and weighing it with candor and liberality.

The question would be perhaps more simple if it were presented not as an alternative proposition to be accepted or rejected, but rather as a matter about which there is no choice. The people of Baltimore have expended about three millions of dollars, in the effort to make a railroad communication with the west, and having arrived at Harper's Ferry, are impeded in their progress by another company, who are decided to possess the exclusive right of way from that point. To aid this company, therefore, in the extension of their work, seems no less the dictate of policy than of necessity, as otherwise the vast amount of money expended in the construction of the railroad to that point would be comparatively of little value. The competion of the canal to Cumberland, independently of the benefit to the railroad, would bring a vast trade within reach of Baltimore enterprize, besides affording great facilities and convenience to that which we already enjoy from the south and western country. Indeed, it might be considered that the importance of a communication with the coal region of Alleghany is of itself sufficient to justify the construction of the canal, and to call for such aid as it may be in our power to afford.

The Committee having thus briefly expressed their opinions on this part of the subject, would recall their own and the attention of the Convention to the great and important object of a communication with the western waters. At a very early period in the history of Internal Improvement, this was the ultimate object to which the efforts of all the States and companies was directed. New-York, Pennsylvania, Maryland, and the District of Columbia, all engaged in the enterprise—opinions were divided not only as to the best route, but also the best mode which should be adopted. Some advocated the valley of the Potomac, whilst others preferred the valley of the Susquehanna. The zealous advocates of railroads would not listen to any thing else, whilst the steady supporters of canals as tenaciously adhered to their system. In the mean time the various works which had been projected were pushed forward with all the efforts which power and interest could exert, stimulated to an increased action by the zeal of rivalry, and the anticipation of triumph. The State of Pennsylvania has completed a canal communication from Columbia to Pittsburg, and by means of a railroad, *the communication is now opened on the whole line from Philadelphia to Pittsburg*. New-York, also, by means of her canal and the Ohio canal, now enjoys the benefit of a direct communication with the western waters, and these two great cities are now engaged in a successful competition for the trade of the western country. The works which have been projected in Baltimore and the District to engage in the contest for this trade have, after a period of nearly seven years, reached about one-fourth of the distance to the western waters. The railroad has terminated at Harper's Ferry, a distance of eighty-two miles from Baltimore, whilst the canal has advanced altogether a distance of 104 miles from tide. The total expenditure on these works is about eight millions of dollars.

The Committee look to the extension of the canal to the eastern base of the Alleghany as a work of great importance, and entitled to receive the support of the people of Baltimore, the State of Maryland, and the western States. We must turn in another direction to find a mode of communication with the west—easier, more expeditious, and at less cost.

If we have to wait for the completion of these great works to enter into a competition for the trade of the west, we should find it firmly fixed at New-York and Philadelphia, and our efforts to withdraw it would be in vain. Competition would be too late to rescue from these powerful cities a trade which they had enjoyed for years. If we expect to participate in it we must be early in the field; the delay which has already occurred will render the competition more equal on the part of our eastern neighbors. It is true the natural advantages of our position are great, but it must be borne in mind that this very system of roads and canals has the direct effect of reducing the importance of distances, and will bring all the Atlantic cities upon a much closer equality in reference to the trade and intercourse with the western country—and the vast capital of these great cities, combined with the increased facility and diminished expense of transportation, gives them advantages that will call for all our energies to preserve a trade which has been the source of our rapid advance, and which is now more than ever essential to our permanent welfare and prosperity.

The Committee believe that this important object may be effected, by forming a junction with the Pennsylvania works.

The state of Pennsylvania, as before remarked, has already opened a canal along the valley of theSusquehanna, (and crossing the summit of the Alleghany by a railroad,) thence to Pittsburg; to form a connection with this route has long been a favorite object with some of the citizens of Baltimore, who anticipated the improvements which have been effected in Pennsylvania; and during the same session of the Legislature of Maryland, which incorporated the Ohio Railroad and Canal Companies, a charter was granted to the Susquehanna Railroad Company to extend a railroad to the nearest and most practicable point upon that river. The stock of this company was promptly subscribed for, and its operations were commenced in the full confidence that the liberal policy of the state of Maryland in regard to the extension of improvements through her territory, would be followed by Pennsylvania, and a charter granted to the Maryland company. In this reasonable expectation the advocates of that work were disappointed, and it was not until the last session of the Legislature of that state, that a law was passed which opened the way for the proposed improvement; by that act a railroad is authorized to be constructed from the Maryland line to the borough of York, from which point there is a canal now in operation which communicates with the river Susquehanna,—from the present termination of the Baltimore and Susquehanna Railroad to the town of York, the distance by any of the routes selected for its extension will not exceed sixty miles, and will probably fall short of that number. The cost of the work as estimated by able engineers, will be less than a million of dollars, and it could be completed within eighteen months from the time of its commencement.

The completion of this work would effect the double object of securing the Susquehanna trade to this city, and of effecting a direct communication with the western waters by means of the

Pennsylvania Canal, in the shortest possible time, and at the least expense to ourselves.

The trade of the valley of the Susquehanna, which includes a thousand miles of natural navigation, (the greater part of which is now improved by canals, and which comprises one of the finest countries in the world,) is of vast importance to this city; it has been a fruitful source of profit to our enterprising traders, and has heretofore amounted annually to millions of dollars. But it has diminished—is diminishing, and will be entirely lost, unless some effort be made to secure it. In this point of view alone, it would seem that the extension of the Susquehanna Railroad would be an object worthy of the especial consideration of this convention, but when taken in connection with the fact that it opens the most direct and immediate communication with the western waters, it may fairly present itself for patronage and protection. The committee will avail themselves of another occasion to present to the convention, a view of the trade of the valleys of the Susquehanna and its vast importance to this city. Its magnitude is not sufficiently understood or appreciated by the citizens of Baltimore, and its value is only beginning to be felt as it is about to be lost.

The committee have thus shown in the plainest way in which they could find language to express themselves, the present state and condition of our plans of internal improvements, and the causes which have impeded their progress up to this time.

The conclusion to which the committee have arrived, after the best consideration they have been able to give the matter, is,

First, that it will be the true interest and policy of the people of Baltimore to encourage and promote the completion of the Chesapeake and Ohio canal to Cumberland; and

Secondly, that it is the true interest and policy of the people of Baltimore to encourage ane promote the completion of the Baltimore and Susquehanna railroad, to the town of York, and the river Susquehanna.

The next and most important matter is to suggest the means by which these great works are to be accomplished.

On this point, the committee have no hesitation in coming directly up to the question, and giving their decided opinion, that *it can be accomplished in no other way than by means of the authority of the state, and the pledge of its credit, with such aid as may be obtained from the government of the United States.*

If the position assumed by the committee in the previous part of this report, that the system of internal improvement is the natural and necessary policy of the nation, growing out of its actual condition, be a correct one, it follows that the government is bound to support and maintain it by all the means in its power. There is no State in the Union to which this remark will apply with greater force and truth than to Maryland; fixed in the centre of the Union, with the finest bay in the world leading to her emporium, she has every facility of commerce and intercourse—looking into the interior from Baltimore, she occupies the nearest position upon the Atlantic to the northern and western countries. The great river Susquehanna on the north, and Potomac on the south, open natural channels of communication with the lakes and the western waters, and all the artificial improvements of roads and canals over this immense extent of country do but come in aid of what nature has done for us. Such is the advantage of our natural position, that we have but to stretch out our arms to the Potomac and the Susquehanna, and avail of the trade which others are seeking to draw off from its natural outlet.

The State of Maryland, it is true, has advanced a liberal hand to the support and encouragement of individual enterprize, and in the incipiency of the system, it was perhaps as much as might have been expected. But, in the present state of things, a bolder and more decided course must be adopted by the State, or the public works will fail altogether. Individual means and credit *are exhausted*, and it would be a vain deception to attempt to conceal it. In making an appeal to the State for aid, no people can do it with more confidence than the people of Maryland. It may be fairly estimated that eight millions of dollars have been expended in the various works of internal improvement; of this sum the State holds $500,000 in the Ohio Railroad; $500,000 in the Ohio Canal Company; $100,000 in the Susquehanna; $500,000 in the Washington Railroad; which, with some other contributions to public works, may make the State's subscription to public works amount altogether to two millions of dollars. How different has been the policy of New-York, Pennsylvania and Ohio? There the States upon their own credit have undertaken all their public works—and what has been the consequence? New-York has an intercourse with the lakes and the western country—Pennsylvania has converted every stream in her vast territory into a feeder for a canal, and is the first to pass the Alleghany mountains—Ohio has constructed a canal through the State to a port upon Lake Erie, whence she finds an easy way to New-York. Other States have pursued the same policy, and their people are deriving the benefit from it. It is time the State of Maryland should take the lead of her people in this great effort to sustain their vital and important interests, and her own standing in this great confederacy.

The committee cannot permit this occasion to pass without exhorting the Convention to a steady perseverance in the objects which have brought them together. They cannot fail of success; there is too much spirit and enterprize, too much wealth, and too much pride, in the people of Baltimore, to permit it to sink below its natural position. It needs only that we should give a concentrated expression to public opinion to produce a combination of action, and effect all that we desire. The public works must and will be completed, and no power upon earth can prevent it. Let us act under these impressions, and with this conviction, and Baltimore will soon resume her position amongst the Atlantic cities.

The Committee, in obedience to the requisition of the Convention, have had under consideration the proceedings of the citizens of Cumberland, in relation to a proposed Convention, to be held in this city, on the eighth of December next,—and beg leave to submit the following remarks:

The Committee on Internal Improvement, to whom was referred the Resolution requiring them "to enquire into the expediency of recommending to the citizens of Baltimore to assemble in Town Meeting, for the purpose of considering the proceedings of a meeting in Alleghany County, in relation to the Chesapeake and Ohio Canal," beg leave respectfully to report—that while the field of labor entrusted to their particular care is extensive, and necessarily requires arduous and close investigation, they feel that their labor is very much lightened, and the extension of their investigation much contracted, in consequence of the specific nature of the resolution under which they are called to act. The inquiries which naturally present themselves to the minds of your Committee, in relation to the subject of this resolution, are first, the nature and object of the Chesapeake and Ohio Canal; and second, the relations which the City of Baltimore bears to it.

The Convention is no doubt aware that one of the most serious subjects which ever engaged the attention of the Father of his Country, was the completion of an easy, safe, and speedy communication between the Eastern and Western portions of our land; justly believing that if such an object could be accomplished, it would tend greatly to prevent that alienation of affection among our citizens, which might grow from the circumstance of their being widely separated by the great natural barriers which would exist between them—and at the same time, by an interchange of commercial intercourse, create those sympathies which would naturally bind them to each other by a common interest; with these views his attention was directed to the Valley of the Potomac, as being a route which seemed to present greater facilities for the accomplishment of so desirable an object than any other. The first efforts made for this purpose were to incorporate a Company, who endeavored to improve the bed of the river so as to render it navigable as far as possible above tide water, without incurring the expense and labor of excavating a Canal—and large sums of money were expended, but without producing any important effect. In the year 1824, a Company was incorporated for the purpose of building a Canal along the banks of the river, from Washington City to the Ohio River, having all the rights and privileges appertaining to the former Company—and in the year 1828, the first earth was removed, in the commencement of this important undertaking. Since that period, it has been gradually progressing, aided by the patronage of the Government of the United States and State of Maryland, and its present terminus is found 8 miles above the town of Williamsport, and 108 miles from Washington City. The work itself, so far as it has been completed, is of the most magnificent character, and well calculated for the important purposes which it is designed to subserve. It is 50 feet wide and 6 feet deep, being considerably larger than any similar work in this country—and when completed, will be capable of receiving and bearing upon its bosom the incalculable wealth of the interior, with more facility and to a greater extent than any similar work in the country. It will be one of those arteries which by the action and re-action of commercial facilities, rendered to the East and to the West, will tend to bind our citizens more closely together, and to diffuse the blessings of prosperity and peace to the most distant portions of our land. But it would appear to be useless to detain this Convention and to occupy its time in enlarging upon the object of this work. So national is its character, and so palpable its object, that "he who runs may read, and the wayfairing man, though a fool, need not err therein."

Your Committee now approach a more important consideration, viz.: the relation which the City of Baltimore sustains to this important work; and in doing so, it is natural to inquire what are the facilities which she enjoys in comparison with her eastern neighbors, the cities of Philadelphia and New-York, as regards a communication with the West. As respects local situations we see she has decidedly the advantage. The distance from Baltimore to Pittsburgh, on the Ohio River, is about 240 miles; while from Philadelphia it is 300, and from New-York, perhaps, not less than 500 miles. But the advantageous position of Baltimore, in a commercial point of view, will be more readily seen, when we consider the relative price of transportation, by wagons, between it and Pittsburgh, and Philadelphia and Pittsburgh. For many years the difference in favor of Baltimore was from fifty cents to one dollar per hundred pounds—and while she was enabled to present a market for the purchase and sale of such goods as would not bear any accumulation of charge for transportation, such as groceries, domestic goods, hardware, &c. she even caused her eastern neighbors to become tributary to her prospects and to acknowledge her superior position, in regard to the great West, by becoming the place of transit for the goods purchased there. Under these happy circumstances she was rapidly growing into importance, until the successful application of steam in the navigation of the Western waters gave the first severe blow to her prosperity, and transferred to the city of New-Orleans much of that trade, which, until then, belonged to her. But this event only affected her in common with the cities on the eastern seaboard, and left her with all her natural advantages still unimpaired—and had nothing occurred to counteract these advantages, she might, notwithstanding, have gone on a career of substantial and unfailing prosperity. But unfortunately for her prospects, this change has occurred, and unless she can find a remedy, she must see the fountains of her prosperity, one by one, dried up, and eventually become an object of loneliness and desolation to the passing traveller, as he contemplates the remains of her former glory. The State of New-York, under the auspices and energies of one of the most gigantic minds of which our country could ever boast, conceived and executed the magnificent plan of uniting the waters of her own Hudson with those of the far distant Western Lakes, and as a result, her emporium is now deriving the rich returns of so noble and enlightened an enterprise. In consequence of these spirited and successful efforts, the young, though vigorous State of Ohio, finding her interests so deeply involved, undertook to accomplish a similar work from Lake Erie to her Southern Boundary, on the Ohio River, thus affording a continuous Canal, Lake, and River navigation, from the

Ohio River to the City of New-York, a distance of more than 1000 miles, and as a consequence of these stupendous efforts, your Committee would state the singular fact that goods may be delivered at Portsmouth, at the Southern terminus of the Ohio Canal, from the City of New-York, more than 1000 miles, at a less rate of transportation than would be required from Baltimore to Wheeling, a distance ofonly 290 miles, even at the lowest prices at which our carriers can live and sustain their wagons and teams.

The great State of Pennsylvania, finding herself likely to be outstripped by her northern neighbor, in the race for the golden prize, devised and executed a system of Canal and Railroad transportation from Philadelphia to Pittsburgh. By this means, goods may now be transported from the former city to the latter in the short time of about 10 days, at the rate of $1 to $1,25 per hundred pounds; so that her commercial emporium has not only regained all she lost in consequence of the early completion of the New-York and Ohio Canals, but is continually experiencing an accession of trade, derived from one of these very sources. From this view of the case, it will be seen that our natural advantages, without being improved by some artificial means, are no longer of much avail to us in the transportation of goods westwardly. But your Committee would also shew that, as a commercial city, Baltimore is likely to be affected quite as seriously in the other direction. The superior natural advantages of Baltimore were at one time quite as valuable to her in the reception of produce from the West as in the transportation of merchandize towards that quarter. Wagons could always afford to haul much cheaper to her than to Philadelphia, and as a natural consequence, immense quantities of Bacon, Tobacco, Glass, Wool, &c., the products of the West, sought their natnral market here, but such, unfortunately for her, is not the fact under existing circumstances; all those articles and many others now find a cheaper mode of transportation to Philadelphia, by the Pennsylvania Canals, and although the Tobacco crop of Ohio is still brought to this market, via the Pennsylvania Canals, in consequence of the facilities rendered by our inspection laws, and from the fact of its being a large market for that article, as the product of this State, yet it cannot be supposed that such can long continue to be the case, but that Philadelphia will soon afford all the facilities which may be necessary both to command and retain the trade.

Your Committee have been thus minute, perhaps prolix, in their detail of the present commercial prospects of our beloved City, in order that they might impress them more forcibly upon the mind of each member of this Convention, and induce him to look more anxiously about for some mode of relief from the ruin which evidently stares us in the face; and without pretending at all to express an opinion as to the comparative importance of the Chesapeake and Ohio Canal, with other projected works of improvement, your Committee would respectfully call the attention of this Conventfon to the following views in relation to the relief which will be afforded by this work, provided it is completed even as far as Cumberland, and especially if it be completed to its intended termination, viz.: the Ohio River. The distance from the City of Baltimore to the Point of Rocks, by the Baltimore and Ohio Railroad, is about 70 miles, at which point the Baltimore and Ohio Railroad Company will deliver goods at the rate of 20 cents per hundred pounds—thence per Chesapeake and Ohio Canal to Cumberland, 140 miles, upon which distance goods may be transported at the rate of 2 cents per ton per mile, or for 14 cents per hundred pounds for the whole distance—thence to Pittsburgh by wagon, the price of transportation, say 105 miles, cannot exceed 50 cents per hundred pounds, making the cost of transportation the whole distance, 84 cts. and allowing 16 cents more for the cost of freights and agencies in transhipment, it will be seen that the cost will not exceed one dollar per hundred pounds from Baltimore to Pittsburgh. Your Committee believe, moreover, that the rate of transportation, especially upon the Canal, are high—the price charged for toll upon the Pennsylvania Canal, is believed to be only 11 mills per mile, which is but little more than one half the present rate charged upon the Chesapeake and Ohio Canal; and they have no doubt that when the immense transportation to be done between the East and the West shall have taken this channel, the price will be materially lessened, so that, eventually, goods may be delivered on the Ohio River at perhaps little more than half the foregoing estimate.

The assurance recently given in the late annual report of the Baltimore and Ohio Railroad Company, that the Railroad will eventually take this route, and the prospect that with the completion of the Canal to Cumberland, the Railroad will be also completed across the mountains, is not the least encouraging item in connection with this subject, which your Committee would present for the consideration of this Convention.

The distance from Philadelphia to Pittsburgh, by way of the Union and Pennsylvania Canals, is 440 miles, and by way of the Columbia Railroad and Pennsylvania Canal, 400 miles. The distance from Baltimore to Pittsburgh, via Baltimore and Ohio Railroad and Chesapeake and Ohio Canal to Cumberland, and thence to Pittsburgh, is about 300 to 320 miles, so that our naturally advantageous position will always give us the preference on account of the great cheapness of transportation. Your Committee do not draw the comparison between the Pennsylvania Canal and the Chesapeake and Ohio Canal, &c. from invidious motives, but simply with the view to show our relatively greater natural advantages, and that with those advantages, properly improved, there is no room for despair. No, the great West will give employment to all the channels of communication now opened or in contemplation, and perhaps as many more, and our feelings should rather be those of a family partaking at the same bountiful table, than of rivals, each striving to obtain whatever is within its reach, and greedily grasping at what is not, in order to appropriate it selfishly to himself.

Your Committee have not adverted to the immense advantages to be derived from the transportation of coal, lumber, stone, &c. to be found abundantly distributed along the banks of the Canal, and for which object alone it would be worth all its cost—but have confined their observation to the bearing it has upon the great commercial interests of our city with the West, believing that these fell more especially within the line of the duty devolved upon them, and under the deep and abiding convictions of the truth of the facts and observations recited in the foregoing reports, they submit the following resolutions:

Resolved, That it is the true interest and policy of the people of Baltimore and the State, to promote the completion of the Chesapeake and Ohio Canal to the town of Cumberland, in this State.

Resolved, That it is the true interest and policy of the people of Baltimore and the State, to extend the Susquehanna Railroad to the Borough of York and the river Susquehanna.

Resolved, That this Convention earnestly recommend to the citizens of Baltimore to assemble in town meeting, for the purpose of considering the proceedings of a meeting held in Cumberland, Alleghany County, in relation to the extension of the Chesapeake and Ohio Canal, and that the Mayor be and he is hereby requested to call said meeting.

Which were adopted.

Report of the Probable Revenue of the Chesapeake and Ohio Canal, made to the Baltimore Convention, December, 1834.

MR. STEWART, from the Committee appointed to report as to the probable amount of tolls receivable on the Chesapeake and Ohio Canal, after it reaches the Coal Mines near Cumberland, and after its completion to Pittsburgh, made the following Report:

That the Committee have given the subject an attentive consideration, and the result is a firm conviction that the Chesapeake and Ohio Canal will afford a more profitable investment of funds than any other similar work of Internal Improvement in the United States; possessing, as it does, advantages in reference to *climate, distance, structure*, and *sources of revenue*, decidedly superior to any other constructed or contemplated. To satisfy the public of the correctness of this position, the Committee will not deal in (what is too common on such occasions) assumed facts and speculative reasoning, but they will content themselves with a brief and plain statement of well known and ascertained facts, about which there can be no controversy, and which they respectfully submit, without comment, leaving an enlightened public to supply the argument and the conclusions.

The object of the Chesapeake and Ohio Canal is to connect the tide water of the Atlantic with the Ohio and Mississippi, and ultimately with the Lakes, and as its revenue must, in some measure, depend upon its ability to maintain a successful competition with other similar works, the Committee will submit, in the first place, a comparative view of the three great lines of communication between the Atlantic and the West,—the New-York, Pennsylvania, and the Chesapeake and Ohio Canals. The Committee are, however, far from indulging the erroneous idea that these works can be properly regarded as rivals, that the one can possibly supersede the other, or that their interests can come materially into conflict; on the contrary, a moment's reflection upon the immense increase of the population and commerce of the West must satisfy every one that the time is not distant when not only these, but additional communications, will be indispensable to give vent to this vast and increasing intercourse.

COMPARATIVE VIEW,

As to distance, time, lockage, dimensions, climate, and cost of transportation, on the New-York, Pennsylvania, and Chesapeake and Ohio Canals, in connection with the Ohio River and the Lakes.

The distance from New-York to the Ohio river, by the New-York and Ohio Canals, is 1,008 miles—670 thereof canal, 145 river, and 193 lake navigation; on this line there is 1,877 feet of lockage—692 on the New-York, and 1,185 on the Ohio Canal; and three transshipments, one at Albany, another at Buffalo, and a third at Cleveland.

From Philadelphia to Pittsburgh, by the Columbia railroad and Pennsylvania canals, is 394 miles—276 by canals and 118 by railroads; the ascent and descent on this route is 5,220 feet; and, by the Schuylkill, Union, and Pennsylvania Canals, the distance is 441 miles, ascent and descent 4,514 feet, 1,944 by locks, and 2,570 by inclined planes; and, as the latter route is found to be the cheapest for transportation, it is adopted for the purpose of this comparison. On this line there are two transshipments, one at Holidaysburg, and the other at Johnstown.

From tide water at Washington City to Pittsburgh, by the Chesapeake and Ohio Canal, is 341 miles continuous canal, lockage 3,215 feet; and when the canal shall have reached Cumberland, the distance from tide, to the navigable waters of the West, will be only 258 miles, viz.: 186 miles by the Chesapeake and Ohio Canal, and 72 from thence, by the Cumberland road, to Brownsville, on the Monongahela, where steamboats now arrive and depart for New-Orleans daily, for several months in the year, and on which the cost of transportation would be $13 58 per ton, viz.:

By canal 186 miles, at 3 cents per ton,	$5 58
By Cumberland road to Brownsville, 72 m.,	7 00
By steamboats to Pittsburgh,	1 00
	$13 58

The dimensions of the New-York and Ohio and Pennsylvania Canals, are the same, viz.: 40 feet at water line, 28 at bottom, and 4 feet deep. The Chesapeake and Ohio Canal is 60 feet at water line, 42 at bottom, and 6 feet deep, being 50 per cent. larger than the New-York, Ohio, and Pennsylvania Canals; the cross section of the one is 306 square feet, and the other only 136, and the moving power differs in the ratio of 100 to 171. It is ascertained on the New-York, Ohio, and Pennsylvania Canals, that freight boats travel from 2 1.2 to 3 miles per hour, and having relays of horses, usually travel night and day, making from 60 to 70 miles in 24 hours. For the purposes of this comparison we

will assume 45 miles as the average in 24 hours; the cost of transportation we estimate at 3 cents per ton per mile, (two for tolls and one for freight;) each transshipment is supposed equal to one day's delay, and to cost 12 cents per ton.

The trade of the lakes at Cleaveland will have to travel 701 miles to New-York, 623 miles to Philadelphia, and 523 miles to Washington City, by way of Pittsburgh.

Applying the above facts and principles, the result is as follows:

Communication.	Distance to Ohio river.		Time, days.		Cost per ton.
N. Y. Canal,	1,008	At 45	22½	At 3	$30 24
Pennsyl'a do.	441	miles	10	cts. per	13 23
Ches. & O. do.	341	per	7½	ton per	10 23
		day,		mile,	

And it will be observed that the above is the comparative result as to distance, time, and cost, without claiming any thing for the Chesapeake and Ohio Canal, on account of its enlarged dimensions or for its continued navigation for one or two months in the year, after the New-York Canal is closed by ice; nor have the Committee added any thing to the delay or expense of transportation on the New-York and Pennsylvania Canals on account of three transshipments on the one and two on the other, which will certainly more than counterbalance any supposed advantage that can possibly be claimed in any other respect.

As doubts have been expressed as to the practicability of a continuous water communication by the Chesapeake and Ohio Canal, the Committee beg leave to remark, that repeated examinations and measurements, made during the driest seasons of the year by the United States Engineers, as well as those of the Company, have uniformly resulted in demonstrating that the supply of water at the summit level is abundant. Mr. Sullivan, one of the Board of Internal Improvement, affirms, in his report, that the "supply of water capable of being brought to the summit level, is more than treble that required," and that the Canal is competent to the passage of tonnage sufficient to realize tolls, at the usual rates, equal to 5,500,000 dollars per annum, or 30 per cent. upon its estimated cost; and more recent surveys have also demonstrated that the principal coal vein at Savage, and other points where opened, is within 48 feet of the elevation fixed for the tunnel; and from the indications of coal on both sides of the ridge, near the commencement and at the termination of the tunnel, the opinion is entertained that it may pass through a continuous coal vein of fifteen or twenty feet in thickness; if so, the coal would more than compensate for the whole expense of its excavation.

In England there are many tunnels nearly as extensive as that here proposed, and some exceeding it, viz.: The Bridgewater Canal has a tunnel of 4 miles in extent; Huddersfield 3; Derby 2; Ellsmere 2; Grand Junction 2; Hereford and Gloucester 2; Kent and Avon 2, &c.

Having thus established, by a statement of facts which it is believed cannot be controverted, the decided superiority of the Chesapeake and Ohio Canal, in reference to *climate, distance, structure,* and *cost of transportation,* it remains for the Committee to submit some facts calculated to show the probable amount of revenue or tolls receivable after the Canal reaches the coal mines, and after it is completed to Pittsburgh; and, in this respect, they think the superiority of the Chesapeake and Ohio Canal will still be more conspicuous.

The sources of revenue relied on are,

1st. Coal—by far the most productive source of revenue on all canals where found, in Europe and America.

2d. Lumber—abounding on this Canal, and affording one of the principal sources of revenue on the New-York Canal.

3d. Lime of the best quality, and at the cheapest rates, made on the line of this work.

4th. Iron and other minerals, and marble, found in abundance, and of superior quality, on the margin of the Canal.

5th. The products of the Potomac fisheries, equal to any in the Union.

6th. Rent of water power—being abundant for milling and manufacturing purposes.

7th. Agricultural produce from the western and other states, and parts of Virginia, Pennsylvania, and Maryland.

8th. Merchandise, &c. for the western States.

And first, of coal. The Committee lay down this position with perfect confidence, that *bituminous coal, of superior quality, can be delivered on tide water for a less sum, by this canal, than it can be delivered at any other port on tide water in the United States.* If this be true, it follows as a matter of course, that there will be no limit to the demand for exportation but the capacity of the canal to deliver it.

Let the truth of this be tested by adopting the prices paid for mining, tolls, and transportation, on canals now in operation in Pennsylvania and New-York.

The Chesapeake and Ohio canal will penetrate and pass through coal banks from ten to twenty feet in thickness on the margin of the Potomac above Cumberland, from which the coal can be thrown into the coal boats with a shovel; and to show the inexhaustible supply at the Savage coal mines, the Committee refer to the following extract from the report of one of the Chief Engineers, N. S. Roberts, Esq. in 1829, to the Board of Directors, in which he says, "The coal district thus accommodated, would be not less than five miles wide, covering a surface of more than 200 square miles. Over at least one fifth of this it is believed the thick vein of coal extends, which measures, where it is now opened, at least 13 feet thick. But the coal mines that could be opened, within five miles of Westernport and Savage, would yield coal to an immense amount. As each square mile of the great vein alone would yield more than two hundred millions bushels of coal, or 60,000,000 tons, and if it could be exported at the rate of five hundred tons per day, it would require four hundred years to exhaust one square mile of the great coal vein! Iron ore of excellent quality is said to abound in this coal district; and with the facilities of a canal transportation, together with the cheapness of bituminous coal, charcoal, and subsistence, in a very healthy country, would be an inducement to the enterprising of our citizens to extend the manufacture of iron to a great amount, and thereby improve and give great value to the water power that might easily be created on Savage river and the Potomac, for all the manufacturing and mechanical purposes of a very extensive population."

It is a well known fact, that on the Monongahela river, coal excavated from similar mines is now delivered at thirteen steam mills and factories, at one cent per bushel. It is presumed it will not cost more, under similar circumstances, to deliver it in a coal boat on the Potomac; but let this sum be doubled, and say that coal in boats will cost . . . . . 2 cts. per bhl.

Tolls.—The tolls charged on the Pennsylvania canal for transportation of coal, is half a cent a ton per mile, which at 28 bushels per ton will be nearly . . . 4 do. do.

Freight.—A boat carrying 1,680 bushels, travelling 2 miles per hour, or 48 miles in 24 hours, (less than the usual speed,) will reach tide in 4 1-2 days; it will require, say 2 men, $2, a boy and horse 75 cents each, making $3,50 per day, or $15,75 for the trip, equal to nearly . . . 1 do. do.

It is presumed that the returning freight from Washington and the Baltimore railroad will at least pay expenses; but suppose there be no return loading, charge as above . . . . . 1 do. do.

Profits.—Add for profits $32 per load, more than 25 per cent. on the whole capital employed . . 2 do. do.

Total at tide . . . 10 cts per bhl.

But suppose the canal to terminate at Cumberland, and the coal to be carried 7 1-2 miles on a railroad, and to cost in the boats 4 1 2 cents instead of 2, as above, difference 2 1 2

12½ cts. per b.

The Committee have thus adopted the most liberal allowances, more than they believe will be the actual cost; and they feel confident that the strictest scrutiny into all the elements of the calculation cannot increase the price they have adopted.

If then the bituminous coal from Cumberland can be delivered at tide, for this sum, of course it can be transported coastwise to all our Atlantic ports and towns cheaper than it can be obtained from any other part of the world; and if so, can there be any assignable limit to the demand?

Let us see whether this position is sustained by facts. The cost of transporting coal from Philadelphia to Washington, (as a regular business and not as ballast,) is $1 50 per ton, or 5 cents per bushel; to Baltimore, coastwise or by railroad from Point of Rocks, 4 cents per bushel; to Boston $2 per ton, or 7 cents per bushel, and it may be carried to Charleston, or the most distant of our seaports for 8 cents per bushel, which is more than is received by importers from Liverpool, viz.: cost at Liverpool 12 1-2, duty 6 cts.; deduct, also, insurance, commissions, wharfage, &c., and it leaves less than 8 cents for freight. Apply these facts, and the cost of Cumberland coal will be in our principal cities as follows, viz.:

In Washington, Alexandria, and Georgetown, (per bushel) 12 1-2 cts
Present price $7 per ton, or 25

Saving, 12 1-2

In Baltimore it will be 16 cts., viz.: at Washington, 12 1-2
Freight, 4

16 1-2
Present price, 25

Saving, 8 1-2

In Philadelphia it will cost 17 1-2 cts., viz.: at Washington, 12 1-2
Freight now paid, 5

17 1-2

The price of bituminous coal is now $7 per ton, or 25

Saving, 7 1-2

[At Philadelphia, Anthracite is $5 per ton, or 17 1-2 cents per bushel; so that the Cumberland will not affect the Anthracite, but merely supply the bituminous coal, required for many uses to which the Anthracite is inapplicable, viz.: gas, coke, smith's shops, steam purposes, &c.]

In Boston it would cost 19 1-2 cts., viz.: In Washington City, 12 1-2
Freight, 7

Present price in Boston $9 per ton, or (per bushel) 32

Saving, 12 1-2

Thus it appears, from well authenticated facts, collected with great pains, that Cumberland coal can be delivered, coastwise, at all our Atlantic cities and towns, cheaper than it can be obtained from any other part of the United States, or Europe; and of course the capacity of the canal to furnish it will be the only limit to the supply required.

What, then, will be the capacity of the canal, and the amount of tolls? It is stated by Sir John Sinclair, in his statistics of Scotland, that there was transported in 1824, to the city of Glasgow, (with a population of 147,043,) on the Monkland Canal alone, 1,690,653 tons of coal, equal to 47,338,284 bushels, which, at the rate of half a cent a ton a mile from Cumberland to Washington City, would amount to $1,893,529, equal to 30 per cent. upon $6,000,000, the whole estimated cost of the canal to the coal mines at Cumberland. The dimensions of the Chesapeake and Ohio Canal are greatly superior to those of the Monkland Canal. The tonnage on the Schuylkill Canal, engaged principally in the transportation of coal, was equivalent to 12,483,672 bushels; and the coal actually consumed in Philadelphia, in 1833, (independent of the amount

exported from thence,) amounted to 11,565,000 bushels. This amount alone, if transported on the Chesapeake and Ohio canal, would have yielded at a 1-2 cent a ton per mile, $462,600, nearly 8 per cent. on its entire cost. And it is ascertained that the city of Pittsburgh, with a population, at the last census, of 12,568 souls, consumed, in 1833, 7,665,300 bushels of coal, much of it in her numerous manufacturing establishments. The population to be immediately supplied with Cumberland coal, is as follows:

The District of Columbia,	40,000
The city of Baltimore,	80,620
The counties and towns in Virginia and Maryland, bordering on the Potomac and Chesapeake Bay—population,	557,650
Aggregate,	678,270

Suppose the whole of this population, together with the amount exported to other places, shall not amount to more than thrice the quantity consumed in the city of Pittsburgh, whose population is not one-third of that of the District of Columbia alone, scarcely two-thirds of that of the city of Washington, and the tolls at half a cent a ton per mile, would amount, on this limited quantity, to 919,336 dollars, equal to 15 per cent. on 6,000,000 dollars, the entire cost of the canal to Cumberland. These calculations may seem extravagant, but the facts on which they are founded are well established; besides the fact is notorious, that the tolls on some of the coal canals in England amount to 40 per cent. upon the capital, and shares of stock of £100 are selling in the market for £725. The Mersey and Irwell canal is an instance of this kind. Coal is, however, but a single item: superadd to this the various other sources of revenue relied on, *lime, iron, lumber, marble, merchandize*, &c. and who can for a moment doubt that this canal, when it reaches the coal mines, will yield an ample revenue on the capital invested? And can the United States and the States immediately interested, hesitate to extend, at once, the aid necessary to secure the speedy extension of the canal, now two-thirds completed, to the coal mines? And the more especially when it is recollected that they have already invested more than two millions of dollars in this work, which, with three or four millions expended on the Baltimore and Ohio Railroad, must remain, in a great measure, unproductive, until the canal is carried at least to Cumberland.

But these considerations (merely pecuniary) dwindle to a point, when compared with the higher and nobler objects of uniting and binding together by the ties of interest and intercourse, the great geographical divisions of our country; of connecting, by the nearest and best communication that can be devised, the metropolis of Maryland and the seat of the Federal Government, with the great valley of the Mississippi and the Lakes, thereby attracting a portion of their rich and abundant commerce in this direction, and at the same time opening and rendering productive the richest mines of coal and iron in America, now buried and useless in the bowels of the Alleghanies. These objects alone are worth the whole sum required, even if the investment should never yield one dollar of revenue. When the canal reaches the coal mines its completion to Pittsburgh is secure—its practical results, the benefits and blessings it will every where diffuse, will commend it to the favor of all; but independent of this, the high price of the stock in the market, (at least equal to that of the Schuylkill canal, now more than 100 per cent. above par,) would at once secure the subscription by States and individuals, independent of the United States, to the balance of the stock necessary for its entire completion. If the means were now afforded to extend the work to Cumberland, it is confidently asserted by practical engineers, that the work could be completed in 18 months.

Having shown, as they trust satisfactorily, that coal alone will yield an ample revenue, the Committee will notice briefly the other sources of revenue referred to above: the second of which is

2. *Lumber.*—By referring to the various reports descriptive of the country and its resources, through which the canal passes, it will be seen that the finest forests of timber in the world are found skirting the canal for more than 100 miles of its extent, especially on the Virginia shore, where water power is found in abundance on the spot to convert it into lumber. In 1826 there were 150,226 tons of lumber transported on the New-York canal, which if carried 125 miles on the Chesapeake and Ohio canal, at a cent a ton per mile, would yield $187,780 per annum, equal to three per cent. on the capital.

3. *Lime.*—Lime stone and coal are found together in vast quantities on this canal, under similar circumstances. Lime is made and sold at the kiln in the West for 4 cents per bushel: double this, and say it costs 8 cents, and 6 cents for transportation, the same as coal, and it can be delivered in Washington city for 14 cents per bushel. At this price it would not only supply all the common uses of lime, but constitute the cheapest and best manure to fertilize and restore to the highest state of productiveness the now barren and impoverished lands on the Potomac and Chesapeake, both in Maryland and Virginia, and of course would become a source of immense revenue on the canal, second perhaps only to coal. The amount of tolls on this article we will not attempt to estimate.

4. *Iron, Marble, and other Minerals of the Alleganies.*—The fact that Iron ore is found in the greatest profusion, and of the best quality, in the coal region, is well ascertained, and that marble of superior quality abounds on the line of the Canal is equally certain. The beautiful marble composing the columns of the Capitol was quarried out of the bed of the Canal, about 42 miles from the city. The tolls on these articles the Committee will not undertake to compute, but it is obvious that they would be very considerable.

5. *The Fisheries.*—The revenue which may accrue from the fisheries cannot be computed with any kind of certainty; but when the facility and cheapness with which they can be transported, and the low rate at which they can be supplied at the Potomac Fisheries, no doubt it would be considerable. The price of herring is said to be 25 cents per 1000, and shad $1 50 per 100, and the quantity is so great that fish is a common manure to enrich the lands in the vicinity of the fisheries on the Potomac. Fish could be profitably carried to Cumberland as back loading in canal boats for 25 cents per barrel to Cumberland, which is double the amount paid for coal, the weight being only equal to 2½ bushels of coal, the freight and tolls of which are estimated at 5 cents per bushel.

6. *Water Power* will be equal to almost any demand, and its productiveness must depend upon the number of manufacturing establishments which the very reduced price at which fuel, the raw materials, and the subsistence of labor, can be supplied by the canal, will bring into existence along its line, and at its termination.

7*th*, *The productions of Agriculture.* And 8th. *The transportation of merchandize, passengers, &c.*—The Committee will not extend their report (which they are anxious to make as brief as possible) by going into a detail of the infinite variety of facts, calculated to show the prolific nature of these very fruitful sources of revenue. It is well known that they alone contribute most of the tolls received on the New York, Pennsylvania, and Ohio canals, deriving, as they do, very little from coal and other minerals abounding on this; besides, when we advert to the other advantages enjoyed by the Chesapeake and Ohio canal, in reference to *distance, dimensions, climate,* and *continuity* of canal transportation, no one can doubt that it will enjoy a liberal share of the commerce and trade of the Western States, whose population, judging from the past, will soon exceed that of the East; but, even if this canal were in all respects inferior to those of New York, Ohio, and Pennsylvania, their absolute inadequacy to give vent to the increasing trade and commerce of the West, resulting from its growth in wealth and population, would force upon this work tonnage equal, in time, to its utmost capacity.

Such are the bright prospects to which the patriotic and enlightened contributors to the Chesapeake and Ohio canal may confidently look forward, if the means of its completion are afforded—and the Committee appeal to every candid man to say, whether the facts stated have not fully sustained the declaration with which they set out, that this canal will afford a more profitable investment of funds than any similar work in our country—justifying an appeal even to private capital, looking alone to profit, to seek the Chesapeake and Ohio canal, as affording a more safe and productive investment of funds than any other now open to them in the United States.

Coal canals have been invariably profitable in all countries, often exceeding in tolls the most sanguine anticipations of the friends of the Chesapeake and Ohio canal. In Great Britain, the profits on coal canals have varied from 10 to 170 per cent. per annum, as appears by the following list, taken from a London price current of canal stocks, of October, 1822:

	Share.	Selling Price.	Div'd
Coventry,	£100	1070	44
Erewash,	100	1000	58
Forth and Clyde,	100	470	20
Loughborough,	100	3500	170
Neath,	100	410	25
Oxford,	100	730	32
Stratford & Worcestershire,	140	700	40
Stroudwater,	145	995	22
Trent and Mersey,	100	1710	75
Grand Junction,	100	245	10
Leeds and Liverpool,	100	365	12

beside many others mostly employed in the transportation of coal, some of them 130 miles long, and having one-third more lockage than occurs in the Chesapeake and Ohio canal between tide water and Cumberland.

And even in this country they have been already attended with similar results. The Schuylkill canal, in 1825, when it reached the coal regions, after encountering the greatest difficulties and discouragement, its tonnage amounted to only 5,306 tons—yet, after the mines were opened, and railroads constructed to transport the coal to the canal, the tonnage increased in a few years to 445,849 tons, and the tolls to 328,481 dollars, besides 16,673 dollars for water power, making 345,154 dollars—equal to 12 per cent. on its original cost; and the stock rose from the lowest depression to 160 per cent. above par, viz.: 130 dollars for shares of 50 dollars. The New-York canal, in 1833, after very large reductions on its tolls, yielded 1,422,695 dollars revenue, equal to 15 per cent. on 9,500,000 dollars, its original cost. In 1825 the canal commissioners reported that, according to an estimate made, the tolls would pay the whole cost of the canal in 1836; that the tolls would then amount to one million dollars per annum; that in 1846 they would amount to 2,000,000 dollars, and in 1856 to 4,000,000 dollars; and that if fully employed, they might reach 9,031,000 dollars a year, and thus far this calculation has been more than realized. The debt is already discharged, and although the tolls have been reduced nearly one-third, they amounted, in 1833, to nearly a million and a half of dollars.

Thus has New-York, by a wise policy, not only made herself "the Empire State," by increasing her population and her power, and adding countless millions to the wealth of her people and her metropolis, but she has superadded to all this an annual revenue derived from her canal, free from all charges, sufficient to discharge all the ordinary expenses of her State Government, without levying one cent of tax upon her people. And why shall Maryland and Virginia hesitate to realize similar advantages by the completion of the Chesapeake and Ohio Canal, proved by the clearest testimony to be decidedly superior, being a much shorter, more direct, and central communication from the Atlantic to the west, and possessing, in the coal trade, an inexhaustible source of profit in addition to all those enjoyed on the New-York Canal.

Were this work to be now commenced for the first time, there ought to be no hesitation. And surely, after it has been constructed in the most splendid and durable manner, surpassing any similar work in the world, for more than one hundred miles on its way to the west, shall it be suffered to stop or languish on its journey? Will its early patron, the United States, whose seat of government it connects with the valley of the Mississippi, and the Lakes, constituting an enduring bond of national union, promoting alike the national defence in war, and prosperity in peace—will she, with her ample means, suffer this noble enterprise to be arrested in its progress for want

of that aid which she can so easily afford, without creating one cent of taxation, or one dollar of debt, and the more especially, we ask, can this aid be justly withheld, when it is recollected that the subscription of a million of dollars by the United States, at the commencement of the work, was made with an express understanding, as appears by the report of the Committee, that the United States were to contribute "*a moiety of its entire cost.*" Three millions have been subscribed with this understanding; and after individuals and corporations have been thus induced to contribute their private means to aid in the accomplishment of a great national enterprise, will it not be a violation of every principle of good faith and common honesty to withhold further aid, and thus defeat the work, and ruin the individuals and corporations induced, in this way, to embark their means with the Government in a great national undertaking? These considerations belong to the subject, and cannot be overlooked or disregarded by an enlightened and just government. Let the government, then, influenced by a liberal and wise policy, fulfil its engagements, (implied, if not expressed,) to contribute a sum equal to all others, and the means will be at once afforded to complete the work to Cumberland.

All which is respectfully submitted. In behalf of the Committee,

A. STEWART, Chairman.

The following communication is from a gentleman who is evidently acquainted with the subject upon which he writes. We wish it were as well understood, and as duly appreciated, by the citizens generally of *this state*, and more especially of *this city*—for they, more than any others, are interested in the speedy accomplishment of the works now in contemplation.

The request of R. A. J., in his private note, shall be cheerfully attended to, and we hope he will furnish us with communications frequently, in relation to a subject in which we take a deep interest, and which he so well understands.

To the Editor of the Railroad Journal:

SIR,—You have justly remarked in your valuable Journal, that many and important improvements are now in progress in Pennsylvania and some of the western states, the direct tendency of which is to draw away from New-York the immense trade of the West. There is one of these improvements which has that tendency in an eminent degree, of the operation of which, however, the citizens of New-York, and, I believe, the public, are but partially informed. A plan has been for many years maturing for uniting the Ohio and Pennsylvania canals, and the subject has been before the Legislature of those two States in various forms, for a number of years past.

The State of Pennsylvania has now completed her canal from Pittsburgh, (including the railroad portage across the Allegany ridge,) and from the mouth of Big Beaver up to New Castle, and within about eight miles of the Ohio state line, which has reduced the distance by which this extended line of canal can be united to the Ohio canal, through the Mahoning valley, to about 85 miles. The State of Pennsylvania have declared themselves ready, at any time, to construct the canal to the Ohio line; leaving for the State of Ohio about 76 or 77 miles over a route ascertained to be eminently favorable. This junction canal joins the Ohio canal at Akron, a very flourishing town at the Portage summit, possessing an immense water power, and destined to be an important town.

This subject is now before the Ohio Legislature, and my attention has been called to it at this time, by meeting with an able report from the Hon. Leicester King, chairman of a committee of the senate of that State, recommending the immediate construction of this important work. The committee quote from a recent report of the canal commissioners of Pennsylvania, in which it is observed, "That a cross cut canal, from Akron, on the Ohio Canal, along the valley of the Mahoning to the Pennsylvania canal, would, in the opinion of the canal commissioners, be highly beneficial to both States. It would open a direct, safe, cheap, and expeditious channel for the citizens of Ohio to send their agricultural productions to a market on the sea-board, and enable them, in return, to receive merchandize from the East. It would, by the additional commerce thrown upon the Pennsylvania and Ohio canals, give activity to trade, employment to capital, and business to merchants, traders, and boatmen; and, consequently, it would stimulate and promote the great primary interests of agriculture. Punctuality is said to be the life of business; but to be punctual to engagements requires *certainty* in the means by which those engagements are to be fulfilled.

"Therefore, in a contest for the rich trade of the West and North-West, we should, if possible, avoid all risks and delays, and consequently broken voyages, that may arise from either flood or low water, by having a continuous canal, fromthe Allegany mountains to Lake Erie, and the Ohio river, below its principal obstructions."

The committee also remark, that the proposed canal "will shorten the distance from the point of its intersection with the Ohio canal to Philadelphia, from what it now is to New-York by the Lake and New-York canal, about two hundred miles—save the expense of a double transhipment—avoid the danger and delay of the Lake navigation—lessen the time consumed in the transmission of goods and produce from one extreme point to the other, and render it certain,—all objects of great importance in mercantile operations."

And, again, in closing their report, they observe, "When we take into view the extensive improvements which are rapidly progressing, and in contemplation, in the western part of this State and Indiana, and consider the immense amount of the productions of that vast region of country, which must accumulate during the winter season, to seek an early eastern market through those avenues in the spring, it must be the height of folly to suppose that it would await the opening of the harbor at Buffalo, when it could take this shorter, safer, and more expeditious route to the sea-board, at least five weeks earlier. Nor can they discover any good reason why it should not be preferred at all seasons of the year."

There can be little doubt that the Legislature of Ohio will order the construction of this canal, and there is nothing that presents more forcibly to the mind the importance to the city and state of New-York of those counteracting and great public works now before the Legislature, than the facts and reasoning of this report: showing not only that the business of Ohio would seek by this route the Philadelphia market, but that a large portion of the entire western trade would find the same channel. It is manifestly for the interest of the State of New-York, *before* this immense trade shall have sought for itself other channels, to construct such works as will continue and extend this business through the State to its great commercial mart. And there are no more ready or obvious modes than by the railroad to Lake Erie, through the southern tier of counties—the Olean canal and the ship canal: objects, to the promotion of which, with such prudent foresight and laudable zeal, you have directed so much of your attention. R. A. J.

The following Report was made by WM. R. HOPKINS, Esq. to the Canal Commissioners of Canada. It is another evidence of their determination to share with us the business which now flows to this city.

To the Commissioners for improving the Navigation of the River Richelieu.

GENTLEMEN,—Having been requested by you to give my opinion as to the best manner of improving the navigation of the River Richelieu, I have to state—

That I see no other method of improvement besides the three mentioned by Mr. Fleming, that is worthy of your attention; and, in my opinion, you can only choose between the three following plans:

First—To dredge out the channel where it is too shallow, and to put two jetties into the River at St. Denis.

Second—To cut a new channel past St. Denis, as proposed by Mr. Fleming, and to lower the shoals in other parts of the channel.

Third—To put in a dam, with a lock, in some part of the river, and by it to raise the water above all but the very highest obstructions, which are to be lowered by dredging.

I shall proceed to give my views of all these plans, requesting your honorable board to bear in mind, that I depend on the correctness of the maps and levels that have been shown me.

Nothing need be said of other parts of the river besides the shoals near St. Denis; when these are improved, the other obstructions can easily be taken away, or got over by dredging, and by the dam, if one is put up.

I will consider, First—The plan of Mr. Kuper to deepen the channel, and to erect jetties.

To deepen the channel only, would do very well; but I think it would be a tedious and expensive work.

The jetties are different; they are of no use; dangerous, (in point of stability,) and detrimental in their operation. When they are short, they change the current of the river, and cause it to wear the bottom and the banks; they will probably undermine at their outer ends, and be torn away, and by these means partly remedy the evils they have occasioned. When they are long, and occupy most of the width of the river, they will raise a head of water, and act as a dam; but, from having a space left open in the river bed, they will be less secure than a dam, although equally expensive, for when ice is passing in the river, it will crowd with the water into this opening, and will act with great force against the point of the work. From this danger, a dam is exempt.

The plan next in order, is that of Mr. Fleming—No. 2.

This plan is sensible, and easy of execution; and will be, as I think, an effectual improvement.

A canal from the head of the shoal near St. Antoine, to deep water below St. Denis, along the west shore of the river, can have no objection made to it, that will have much weight. I think the following plan rather better, but there is little difference in the plans.

It is objected, that mud from the land drains will fill this cut, but I do not think so; the current will keep it clear in all probability, and the mud that does not go away with the current, can easily be removed with scrapers, before it accumulates to any serious extent.

The last plan is that of a dam and lock—No. 3.

This plan is, I think, the best, all things considered, for two reasons:

1st. It will improve the whole width of the river, more or less.

2d. It is the cheapest mode of effectually improving the river.

As to the place for the dam and lock, I choose the island marked B, on the map, as the best. Here the water is shallowest, making it the least expensive point to erect a dam upon; and as the river divides into two branches, one of which can be shut by a bank of earth, the dam need not be very long.

As the Commissioners have prepared materials, and began works here, it will save cost to continue the works at this point.

Mr. Fleming objects to a dam,—

1st. That it will raise the water and injure the river bank.

2d. That deposits will form in the pool of the dam.

3d. That dams are insecure.

As to the first objection, it will have little weight. It is only proposed to raise the water two feet by the dam, in any, except very low water, when float boards are on the dam to raise two feet more water.

For the greater part of the last five years, the water has been as high as it would have been during the five years before that, had the dam then been in. Yet it does not seem that the banks have fallen rapidly of late years. A dam in high water produces much less effect than it does in low water; for when the water is high, it passes a low dam as it would a shoal in the river bed, without a great break in the current.

As to the second objection,—

The deposit cannot be serious, or it would before this have began to form mud islands, as there is dead water enough now in the river for them to make in, was there any tendency in this way.

As to the third objection,—

Dams are certainly more exposed to accident than any other works within the range of civil engineering. But with proper care in their construction, they need not fail, when not too high; and four feet is a very low dam.

Manner of locating the work.

I would recommend a bank of earth to be carried from the island marked B on the map, to the east shore of the river. (As Mr. Kuper has began a work there, we may as well follow his line.) This bank must be fifteen feet wide on top, to slope two and a half feet to one horizontal on both sides. The upper side must be protected well with a slope wall.

This bank must be carried from shore to shore, and its top must be two feet above high water mark. This stops the east channel.

The west channel is to be shut by a dam formed of crib work, filled with stone, and well sheet piled; the top must be covered with four inch plank, on which eyes must be secured, to which the irons of the float boards are to be attached; an apron is to be made below the dam, and all the work done according to the specification and plan forming a part of this Report.

The ends of the dam are to be well secured with abutments of cut stone.

The place for the lock I cannot now permanently fix. I must examine further, if I am to decide this point. By the maps, the place most suitable is on the east side of the island, marked B on the map. I would deepen the water, that boats might pass freely from deep water above the dam to deep water below it, a distance of about the half of a mile. This can be no very serious affair.

The lock will be two hundred feet in the chamber, by fifty feet wide between the gates. It is unnecessary, in a lock like this, to go to all the expense that would be incurred if the lift were greater. I therefore propose to make the lock with cut stone work around the gates only, leaving the chamber walled only with rough stone, laid dry, which will form a very permanent and cheap work.

In the plans I have the honor to submit, and in the above Report, I have meant to lay before you the means of forming a permanent work, and one that will properly connect the waters of the St. Lawrence with the Basin of Chambly, that can be speedily made, and that will need few repairs.

I am, gentlemen, truly, your most obedient humble servant,

WM. R. HOPKINS,
Civil Engineer.

RAILROAD MEETING.—At a numerous and respectable meeting of the inhabitants of the town of Monroe, friendly to the construction of the contemplated New-York and Erie Railroad, convened pursuant to previous notice, at the house of De Witt McGarrah, on the 17th day of January, Joseph R. Andrews was appointed President, Lewis H. Roe, 1st Vice President, James Cromwell, 2d Vice President, and Matthew B. Sweezy, and Jas. Gray, Jr. Secretaries. On motion, the object of the meeting having been stated, it was

Resolved, That E. B. Carpenter, Hudson McFarlan, Genest Roe, Peter Ball, and John Seaman, together with the officers of the meeting, constitute a committee to prepare a memorial to the legislature, and to draft resolutions expressive of the sense of this meeting; who reported the following preamble and resolutions, which were unanimously adopted.

Whereas, the contemplated New-York and Erie Railroad is destined, by its construction, to make a speedy communication between the City of New-York and Lake Erie, and to enlarge the commercial business of that city, by bringing to its market a great portion of the products of the adjoining western States, and which will open a great thoroughfare through the southern tier of counties of this state, now secluded by their local situation from the benefits of a ready market, and not possessing the advantages given by nature or art to most of their sister counties, and whereas we highly approve of the system of Internal Improvement adopted and pursued by the State of New-York, for many years past, which has so much exalted the character of the State, and developed the enterprize and liberality of our citizens, and secured to the present as well as future generations many important and lasting benefits,—therefore

Resolved, That we highly approve of the contemplated Railroad from Lake Erie to the City of New-York, and that we believe the inhabitants of the respective counties through which it is to pass have just and equitable claims on the liberality and patronage of the State for aid to carry the same into effect.

Resolved, That this meeting approve of the proceedings of the meeting held at Bath, Steuben County, on the 17th of December last, and that we will memorialize the Legislature agreeably to their recommendation.

Resolved, That the representatives in the Legislature from this county be requested to use their exertions to procure the passage of a law authorising subscriptions on the part of the State, of two millions of dollars of stock, or loan their credit to that amount.

Resolved, That it be recommended to the different towns in this county to hold meetings and circulate memorials to be presented to the Legislature, praying for aid agreeably to the recommendation of the Bath convention.

Resolved, That the following persons constitute a committee to circulate memorials for signatures in this town: Hudson McFarlan, E. B. Carpenter, John Seaman, Jas. Ball, Jas. Gray, Jr. Mills, Hughes, T. G. Wilkes, Joseph M. Shuit, Peter Turner, and Samuel Hughes.

Resolved, That the proceedings of this meeting be signed by the officers thereof, and published in the county papers, and Railroad Journal, in the city of New-York.

JOSEPH R. ANDREWS, President.
LEWIS H. ROE, 1st Vice President.
JAS. CROMWELL, 2d do.
MATTHEW B. SWEEZY, } Secr'ys.
JAS. GRAY, Jr. }

The Legislature of Louisiana convened on the 5th. Charles Derbigny was elected President of the Senate, having received all the votes except one blank, Alcee Labrouche was unanimously re-elected Speaker of the House. On the 6th, Edward D. White was elected Governor of the State, having received 58 votes,—the whole number except three blanks. Gen. Dawson had declined being considered a candidate.

It appears from the Message of Governor Roman, that the receipts into the State Treasury during the past year, amounted $582,254; expenditures $500,867. The value of exports from Louisiana in 1834 amounted to the extraordinary sum of $35,819,185; which is almost double the value of exports from the whole United States in 1760. The exports in 1835 the Governor estimates at about $40,000,000, including 500,000 bales of cotton, 100,000 hhds of sugar, and 25,000 hhds of tobacco.

He warmly recommends the system of internal improvements throughout the State, and particularly the contemplated Rail Road from New Orleans to Natchez.

He also strongly recommends (says the New Orleans Bulletin,) that the warehouse system be adopted in New Orleans as in New York; for its advantages are many and certain.

The exports hence to Mexico are valued at nearly $3.000,000 a year, and the imports at $6,000,000.

The epidemical sickness of this city, (New Orleans) he attributes to the malaria from the swamp between this place and Lake Ponchartrain, and warmly urges the Assembly to adopt means for draining it.

He thinks that by removing the obstructions on the Alchatalya, the lands on the confines of that river will be increased one million dollars in value; and that Louisiana should not be so public spirited or squeamish as to hesitate longer to ask grants of lands from Congress, as well as other States.

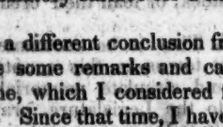
[From the Journal of the Franklin Institute.]

Report to the Board of Directors of the London and Birmingham Railway, on the Formation of a Railway by Undulatory Planes. By Robert Stephenson, Esq., Engineer. Dated 5th May, 1834.*

Since the receipt of the memorial to the directors, respecting the formation of railways by undulatory planes, I need scarcely say that I have been so closely occupied, that I found it impossible to reconsider, carefully, the opinions I had formed on the subject several months ago, founded upon some experiments in "The Gallery of Practical Science," with a model prepared by Mr. Badnall. These experiments were considered by several persons conclusive in favor of an undulatory surface for a line of railway.

I drew a different conclusion from them, and made some remarks and calculations at the time, which I considered fully confirmed it. Since that time, I have read the greater part of the controversy, which has been carried on in the "Mechanics' Magazine," and paid especial attention to the experiments made upon the Rainhill plane, with several of the locomotive engines belonging to the Liverpool and Manchester Railway Company, without perceiving any reasons for changing the view I originally took.

The following observations are extracted from those above alluded to, as far as appears necessary for explaining the outline of the arguments upon which I had based my views:



A C, a horizontal plane.

A B, and B C, two inclined planes completing one undulation.

A carriage, in moving over the inclined plane, may be conceived to be acted upon by three forces, viz.

First.—Gravity, varying directly as the *sine* of the angle of inclination.

Secondly.—Mechanical force, such as a steam-engine, or a spring.

Thirdly.—The uniform retarding force, arising from the friction of the moving parts.

Let n = sine of angle of inclination.
g = force of gravity.
m = mechanical force applied.
f = retarding force arising from friction.

Then the force resulting from the combined action of these three, will be represented by $n\,g + m - f - (m - f)$; it is evident that the motion of the body is influenced solely by the remaining force $n\,g$, and is precisely in the same condition as if friction were annihilated.

In this case, it is evident that the body descending the plane A B, would acquire sufficient momentum to carry it up to the similar plane B C; and were there a series of similar undulations, the body would move forward without interruption, and the velocities in each succeeding undulation would be the same, and the expenditure of mechanical power would be the space passed over, multiplied into the retarding force $= s\,m$, or $s\,f$, s being the space passed over.

Instead of moving on an undulating surface, let the body be now placed on the horizontal plane A C; its motion in this condition can be influenced by two forces only, viz. the mechanical force m, and the retarding force f. If we suppose, therefore, $m = f$, it is obvious that no motion whatever can take place.

At this point of the comparison, a striking difference, and apparently not an unimportant one, exists between the undulatory and horizontal surfaces. In the former, gravity communicates a certain velocity, which is maintained throughout each succeeding undulation; whereas, in the latter, the forces m and f merely destroy each other; consequently the body remains stationary.

This explains the experiment which was frequently repeated, and in many cases went far to convince several persons of the advantage of having an undulatory surface. Very little reflection, however, is requisite to perceive that this advantage is merely apparent, and not real: for let us suppose that the body at A, on the horizontal plane, has the mean velocity given to it, which gravity imparts to the body moving down the first inclined plane of the undulatory surface; it will then move uniformly with this velocity from A to C, and arrive at the latter point at the same time that it would have done on the undulatory line; and however the length may be increased, the body will pass over the distances corresponding to each undulation in the same space of time, whether the surface be undulatory or horizontal.

Let p = power expended in communicating any given velocity to the body on the horizontal surface at A; then the whole power expended in moving the body from A to C, will be $p + s\,m$, or $p + s\,f$.

But when the body arrives at C, it retains its original velocity, and is capable of employing its power, or of moving itself beyond C; whereas, on the undulating surface, the body becomes quite stationary at C. In short, it is a well known law in mechanics, that the velocity which the body possesses, is exactly equal to the power expended in communicating it; we therefore have the absolute expenditure of power in moving the body from A to C $= s\,m$ or $s\,f$, which is precisely the same result as on the undulating surface.

Hitherto we have the forces m and f equal, by which the friction, or retarding force, was merely neutralized; but in practice, m must exceed f, otherwise no motion could ensue on the level plane. When, therefore, m is greater than f, the body will be accelerated by the differences of those forces, viz. $m - f = d$; in this case the motion of the body on the undulatory surface is influenced by a force represented by $n\,g + d$.

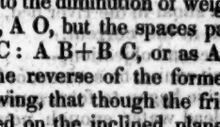
If v and v' represent the velocities generated by the forces $n\,g$ and d, in the same time, then $v + v'$ will represent the velocity which the joint forces will generate in an equal space of time. But the velocity given by the force $n\,g$, in descending, is lost in ascending; hence, the body will arrive at the summit of each undulation, with the velocity due to the action of the force d, which is $\sqrt{2\,d\,s}$.

Now, the velocity acquired by the action of the force d on the level plane, the body having moved over an equal space, is also $\sqrt{2\,d\,s}$; and this equality in velocity must hold, whatever be the nature of the surface over which the bodies move, undulatory or level.

If the body were actually propelled by the force d, more efficiently on the one surface than on the other, it must arrive at the point C, with different velocities. The readiest mode of showing that this is not the case, is to allow it to expend the momentum by moving along a horizontal plane, or one of a given inclination; in both cases, the momentum is precisely equal. This experiment I repeated several times, and felt perfectly convinced that the results were exactly determined.

It has been urged by some that the undulatory surface has an advantage from the friction being reduced, in consequence of the body being on an inclined surface. A moment's consideration will show that this never can apply in practice, from the smallness of the inclination which is admissible; the reduction in the friction from this cause would be inappreciable.

But even allowing it to operate, the undulating surface is increased in length by a quantity that exactly compensates for the reduction in the friction of the carriage.



Because the diminution of friction is proportioned to the diminution of weight, which is as A B, A O, but the spaces passed over are as A C: A B + B C, or as A O: A B, exactly the reverse of the former proportion; showing, that though the friction may be reduced on the inclined plane, the distance is increased precisely in a ratio to compensate it.

The above considerations lead me to conclude that, theoretically, there is neither advantage nor disadvantage in the use of an undulating surface for a line of railway; the question, therefore, resolves itself into one of practical application. This I have frequently and carefully considered, and, generally, with a strong bias in favor of Mr. Badnall's view, because I saw clearly that its introduction would at least reduce the expense of constructing public lines of railway; but I have invariably been compelled to conclude that its adoption would be attended with greater expense in the carriage, greater uncertainty in the operation, in many cases greater inconvenience, and in all greater risks of accidents, than in a horizontal line of railway, or one approaching to it as nearly as circumstances would permit.

Greater ultimate expense, I conceive,

* We have received from Mr. Stephenson, in addition to the manuscript now printed, one containing remarks and calculations on the best form for railway bars, &c., the publication of which we propose to commence in the next number.

would arise in part from the additional wear and tear, both upon carriages and engines, from the varying velocities which must be continually taking place throughout the whole length of the line of road.

This objection is considered by many of no weight; I need only refer, however, to practical men, who have been in the habit of observing the destruction of machinery where varying velocities are admitted; indeed, I cannot refer to a better instance than Rainhill and Sutton inclined planes, where the objectional nature of inclined planes is evident to all conversant with machinery, and from whence (it is probably not too much to say) a very large portion of the wear and tear of the locomotive engines on the Liverpool and Manchester Railway has sprung.

The engines on an undulating line must obviously, at the bottom of each undulation, attain a velocity considerably greater than what is required upon a horizontal line, where it may be nearly uniform.

Now, in locomotive engines, this single circumstance gives rise to three separate objections, neither of which is undeserving of attention, and which are distinct from that of wear and tear arising simply out of velocity.

First.—In the construction of these machines, it is a consideration of the very first importance, to proportion and adapt the relative speeds of the different parts to the velocity at which the engines are intended to travel; and though I am perfectly aware that these engines are worked at different rates of speed, I have seen sufficient to convince me that uniformity in the velocities is extremely desirable, and that they never perform so economically as when the intended velocity is adhered to within very narrow limits, which is quite impracticable on an undulating road.

Secondly.—When the velocity of these engines exceeds that for which they are calculated, the steam acts less forcibly on the pistons, and thus produces an absolute loss of power, or, in other words, an increased consumption of fuel.

Thirdly.—From the present construction of locomotive engines, every different speed of travelling is accompanied with a corresponding increase or diminution of the temperature of the fire, which occasions a continual working amongst the different parts of the boiler, from unequal expansion and contraction, which never fails in a short time to render the boiler more or less leaky.

Every experienced steam-engine builder has had instances brought under his observation, of the destruction of boilers by being exposed to great variations of temperature. In all railways, except such as are perfectly horizontal, this objection applies with more or less force. I therefore only mention it in this place, to show the tendency of the undulating railway would be to aggravate the evil arising from great inequalities in the temperature.

These are my principal reasons for concluding that the expense of carriage would be greater on an undulated line, and the same remarks appear to me to lead to the conclusion, that there would be greater uncertainty in the operation.

Inconvenience would, in my opinion, result from not having the power to halt at any given point on the line of railway. This may be done without inconvenience, on a line of road not possessing inclinations beyond the power of the engines; but where the inclinations of the planes exceed that power, it is clear that some expedient must be contrived to overcome the delay that must ensue. I have only heard of one, which I cannot suppose to have been advanced seriously. I allude to the proposal that an engine, when stopped by any chance on an inclination beyond its power, should be worked backwards and forwards until sufficient momentum be acquired for surmounting the next summit.

This is an operation not only of time, but in many cases would be imminently dangerous, and could not fail to be a continual source of annoyance.

When it is stated that the risk of accident would be increased, it must not be inferred that increase of speed is attended with greater frequency of accident, but rather that such mishaps are likely to be more extensive and serious when they do occur.

I now come to consider more immediately the chief object of the memorial which has been laid before the directors, viz. The expediency of making an experiment on the London and Birmingham Railway, extending over a distance of eight or ten miles, as suggested by Dr. Lardner and Dr. Dalton.

In recommending the directors to make such an experiment, those gentlemen have evidently been influenced by the statement in the memorial, that it would not cost over £500, and that the experiment, should it fail, would be productive of no detriment to the Railway Company.

I have thoroughly considered the expense of such an experiment, and also the probable inconvenience that would arise out of its failure, and supposing the latter result, I am satisfied it could not cost the Railway Company less than £8,000 or £10,000; and this sum may be made to appear without taking into the account many contingencies that would necessarily attend such a circumstance.

The ballasting and laying the rails alone costs from £800 to £1,000 per mile, and this charge must unquestionably be incurred in merely transforming the undulated surface to an uniform one. The embankments would require to be brought to a higher, and excavations to a lower, level; thus interfering with the whole of the bridges, over and under the railway.

In short, you could only prepare for the contingency of a failure, by erecting temporary bridges over the railway, throughout the ten miles, until the utility of the scheme had been determined.

These, and other considerations, connected with the detail of executing the railway, which it would be superfluous to enter into here, and which it would be impossible to render intelligible in a report like the present, fully convince me that it would be at least rash to advise an expensive experiment on the London and Birmingham Railway, which, in any event, could only save a very small sum in the original expenditure, with the possibility of your not succeeding to your expectations; thus producing a result fraught with mischief to the undertaking generally.

I feel it, however, due to Mr. Badnall, to state that I consider a trial upon some branch road might be made with advantage, as the adoption of his ideas would certainly be productive, in many cases, of considerable saving in the first cost, which, in some branch roads, is of paramount importance.

I must, however, again repeat, that no saving of power could be by any possibility effected.

ROBERT STEPHENSON.

GREAT BLAST AT CRAIGLEITH QUARRY.—The long time in which preparations for a great explosion at this quarry have been going on, and the effects that were expected to result from the experiment, by a great saving of labor and expense, in at once dislodging a great mass of rock, and also lessening, if not altogether removing, the risk which attends the blowing up of small portions of rock from the flying fragments, rendered the experiment which took place on Saturday se'ennight, (18th Oct. 1834,) a subject of much interest both in a public and scientific point of view. It having been intimated by bills that the blast was to take place at three o'clock, long before that hour crowds of people were proceeding along the roads leading to the quarry, and by three o'clock every place which commanded a view of the spot was filled with spectators. At the time when the explosion took place, there was no fewer than ten thousand people on the grounds around the quarry; and curiosity was so much excited, that even on the Castle-hill, and also on the Corstorphine hill, a great many people were collected. At half-past two o'clock, the conductor, enclosed in a block-tin tube, 26 feet long, and half-inch diameter, was introduced into the bore. The depth of the bore was 60 feet, and 7½ inches diameter at top, and 6 at the bottom, and was charged with 500 lb. of Sir Henry Bridge's double-strong blasting powder. At half-past three the match was lighted, and in three minutes the explosion took place. The report was not so loud as from a small piece of ordnance; but the effect that was produced was highly satisfactory to all the scientific gentlemen present, and completely fulfilled the expectations that had been conceived by the projector. At the moment of explosion, the great mass of rock appeared to those at a short distance to be forced upwards, and then to rend in large and deep fissures. It is calculated that upwards of 20,000 tons of solid rock have been displaced by this experiment. The plan seems to be perfectly safe and practicable, and, we understand, was conducted and carried through by Mr. Millar, who, in 1824, after the great fire in the Parliament Close, suggested and carried into effect the blowing up of the gable of the high land which overlooked the Cow-gate. Among the scientific gentlemen who were present, we observed Mr. Jardine, Mr. Playfair, Professor Wallace, Professor Forbes, Mr. Stevenson, Mr. Buchanan, and Mr. Grainger. —[Edinburgh Observer.]

Without female society, it has been justly said, that the beginning of men's live's would be helpless, the middle without pleasure, and the end without comfort.

He who has found a friend in whom] he can unreservedly confide, may consider himself as distinguishedly blessed; for a true friend is the greatest of all possible acquisitions.

☞ This number of the Journal has been delayed two days for the purpose of publishing the report of the survey of the New-York and Erie railroad.

☞ We again request subscribers, who desire to perfect their volumes, by supplying *lost numbers*, to forward a list, with their subscription for Volume 4th. Some of our surplus and loose numbers are growing short. "First come first served," with us, as with most others, especially when the payment is *in advance. No charge* is made for supplying a few lost numbers, if they can be furnished without breaking a set; those who wish them must not delay.

"Our favorite Atlantic city," in the subjoined article, is, we need hardly say, the busy bustling thriving city of New York.

Internal Commerce.—A convention composed of proprietors and agents of all the Tow Boats upon the Hudson River, of each line of boats upon the Erie Canal, of all the vessels and Steamboats upon Lake Erie, and of all the lines of boats upon the Ohio Canal, which collectively form the great chain of transportation from the city of New York to the Ohio River, has just closed its labors in this city, after an active session of nearly a week. During this session such explanations and concessions have been mutually made as will result in materially reducing the rates of transportation, particularly on property passing the Ohio Canal. On such property the arrangements are such as will meet the views of the Commissioners of the Ohio Canal, and, it is believed, secure the immense trade which must flow to and from the vast valley of the Ohio, to our favorite Atlantic city.

We view this convention as one in connexion with the progress of internal commerce, and its effects upon the Western Empire as of more consequence than any which has gone before it, for any similar purpose, since the commencement of the Erie Canal. Its doings may be taken as a sure presage that, for the future, in whatever measures the eastern members of our commonwealth may propose to promote the general prosperity, they will always be promptly met by the generous and enlightened liberality of the west.

We are fully informed that there has probably seldom been a convention of individuals whose separate interests have apparently been so various, and who have heretofore been so tenaciously jealous of each other, having passed a week in discussion, and finally separating in such perfect harmony, and unity of views. The convention embraced a mass of intelligence connected with the West, its prospects, and its present and future welfare, which, on no former occasion, has been assembled.—[Buffalo Whig.]

Canal Tolls.—The Canal Board met yesterday at the Comptroller's office, and agreed upon the rates of toll to be charged upon the New York canals for the year 1835. The rates generally have not been altered. On boards, plank, scantling, sawed timber, &c., there has been a reduction from 8 mills to 5 mills per 1000 feet per mile; and the rates on mahogany boards are fixed at 15 mills per 1000 feet per mile, instead of paying merchandize toll. Some other trifling alterations have been made. The rates as adopted will be published in a few days.—[Alb. Arg.]

The gentlemen concerned in the Railroad Line between this city and New York, deserve all praise and encouragement for the facility, safety and convenience with which passengers are transported in despite of the weather. The advantage of this mode of conveyance can be fully appreciated at this season of the year, when, instead of being obliged to ride all night in a mail stage, as has heretofore been the case in the winter, the travellers to New York journey thither as quickly and easily as in summer.—[Nat. Gazette]

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